



# OPTIMUM

MASCHINEN - GERMANY



## Operating manual

Version 3.1.8

### Mill Drill

**OPTImill®**  
**BF 20V**

Article no. 3338128

**115V, 1- Phase**  
**Optional Stand, Item No. 3353003**





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## Preface

Dear customer,

Thank you very much for purchasing a product made by OPTIMUM.

OPTIMUM metal working machines offer a maximum of quality, technically optimum solutions and convince by an outstanding price performance ratio. Continuous enhancements and product innovations guarantee state-of-the-art products and safety at any time.

Before commissioning the machine please thoroughly read these operating instructions and get familiar with the machine. Please also make sure that all persons operating the machine have read and understood the operating instructions beforehand.

Keep these operating instructions in a safe place nearby the machine.

### Information

The operating instructions include indications for safety-relevant and proper installation, operation and maintenance of the machine. The continuous observance of all notes included in this manual guarantee the safety of persons and of the machine.

The manual determines the intended use of the machine and includes all necessary information for its economic operation as well as its long service life.

In the paragraph "Maintenance" all maintenance works and functional tests are described which the operator must perform in regular intervals.

The illustration and information included in the present manual can possibly deviate from the current state of construction of your machine. Being the manufacturer we are continuously seeking for improvements and renewal of the products. Therefore, changes might be performed without prior notice. The illustrations of the machine may be different from the illustrations in these instructions with regard to a few details. However, this does not have any influence on the operability of the machine.

Therefore, no claims may be derived from the indications and descriptions. Changes and errors are reserved!

Your suggestion with regard to these operating instructions are an important contribution to optimising our work which we offer to our customers. For any questions or suggestions for improvement, please do not hesitate to contact us.

**If you have any further questions after reading these operating instructions and you are not able to solve your problem with a help of these operating instructions, please contact your specialised dealer or**

LDS Industries, LLC  
930 W. National Ave.  
Addison, IL 60101  
Tel.: 1-630-785-6437



## 1 Safety

This part of the operating instructions

- explains the meaning and use of the warning references contained in the operating manual,
- explains how to use the lathe properly,
- highlights the dangers that might arise for you or others if these instructions are not obeyed,
- tells you how to avoid dangers.

In addition to this operating manual please observe




- applicable laws and regulations,
- legal regulations for accident prevention,
- the prohibition, warning and mandatory signs as well as the warning notes on the mill drill.

Consult OSHA, state and local regulations in order to determine compliance, danger and risks to the operator.

**Always keep this documentation close to the mill drill.**

If you would like to order another operating manual for your machine, please indicate the serial number of your machine. Please find the serial number on the type plate.

### 1.1 Type plate

<b>Milling machine</b>		LDS Industries, LLC	
<b>BF 20 Vario</b>		930 W. National Ave. Addison, IL 60101	
<b>NO.</b>	333 8128		3000 rpm
	1,2 HP 115 V ~60 Hz	<b>SN</b>	J
	227 lbs	<b>Year</b>	20

### INFORMATION

If you are unable to solve a problem using these operating instructions, please contact us for advice:

Exclusive USA Agent

LDS Industries, LLC

930 W. National Ave.

Addison, IL 60101




Tel.: 1-630-785-6437



## 1.2 Safety instructions (warning notes)

### 1.2.1 Classification of hazards

We classify the safety warnings into various levels. The table below gives an overview of the classification of symbols (ideogram) and the warning signs for each specific danger and its (possible) consequences.

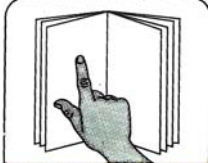
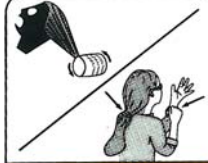





















Ideogram	Warning alert	Definition / consequence
	<b>DANGER!</b>	Threatening danger that will cause serious injury or death to people.
	<b>WARNING!</b>	A danger that might cause severe injury to the staff or can lead to death.
	<b>CAUTION!</b>	Danger or unsafe procedure that might cause injury to people or damage to property.
	<b>ATTENTION!</b>	Situation that could cause damage to the mill drill and products and other types of damage. No risk of injury to people.
	<b>INFORMATION</b>	Application tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram by





## 1.2.2 Other pictograms

 <p><b>WARNING</b></p> <p>READ and UNDERSTAND instruction manual to avoid serious injury. If a manual is not available, DO NOT use machine. Call 1-800-266-9079</p>	 <p><b>WARNING!</b></p> <p>ENTANGLEMENT HAZARD! Tie back long hair, roll up long sleeves, and remove loose clothing, jewelry, or gloves to prevent getting caught in moving parts.</p>	 <p><b>WARNING</b></p> <p>Pinch/Entangle Hazard! Keep hands clear of outboard spindle and rotating workpiece to avoid serious injury.</p>	 <p><b>WARNING!</b></p> <p>PINCH/ENTANGLEMENT HAZARD Keep spindle guard in place and hands clear of outboard spindle and rotating workpiece to avoid serious injury.</p>
<p><b>WARNING</b></p> <p>Read and Understand instruction manual to avoid serious injury. If a manual is not available do not use machine. Call 1-855-813-1043</p> <p>Eye injury Hazard! Always wear safety glasses when using this machine.</p> 	<p><b>WARNING</b></p> <p>Disconnect power before adjustments, maintenance, or service.</p> 	 <p><b>WARNING</b></p> <p>EYE INJURY HAZARD! Always wear safety glasses when using this machine.</p>	
 <p>Activation forbidden!</p>	 <p>Warning of flammable substances!</p>	 <p>Warning of suspended loads!</p>	 <p>Warning risk of stumbling!</p>
 <p>Warning tilting danger!</p>	 <p>Warning of automatic start-up!</p>	 <p>Warning of biological hazard!</p>	 <p>Read the operating instruction!</p>
 <p>Pull the main plug!</p>	 <p>Use safety glasses! protection</p>	 <p>Use face shield!</p>	 <p>Use protective boots!</p>
 <p>Use protective suit!</p>	 <p>Use ear protection!</p>	 <p>Protect the environment!</p>	 <p>Contact address</p>



## 1.3 Proper use

### WARNING!

**In the event of improper use, the mill drill**

- there may be a risk to the staff,
- the mill drill and other material property of the operating company will be endangered,
- the correct function of the mill drill may be affected.



The mill drill is designed and manufactured to be used for milling and drilling cold metals or other non-flammable materials or materials that do not constitute a health hazard by using commercial milling and drilling tools.

The mill drill must only be installed and operated in a dry and well-ventilated place. If the mill drill is used in any way other than described above, modified without the approval of the company Optimum Maschinen Germany GmbH then the mill drill is being used improperly.

We will not be held liable for any damages resulting from any operation which is not in accordance with the intended use.

We would like to stress that any modifications to the construction or technical or technological modifications that have not been authorised by the company Optimum Maschinen Germany GmbH will also render the guarantee null and void. It is also part of proper use that

- the maximum values for the mill drill are complied with,
- the operating manual is observed,
- the inspection and maintenance instructions are observed.

📖 "Technical data" on page 15

### WARNING!

**Heaviest injuries through improper use.**

**It is forbidden to make any modifications or alterations to the operating values of the mill drill. These could endanger the staff and cause damage to the mill drill.**



### ATTENTION!

**If the mill drill is not used as intended or if the safety directives or the operating instructions are ignored the liability of the manufacturer for any damages to personnel or objects resulting hereof is excluded and the claim under guarantee is becoming null and void!**



## 1.4 Reasonably foreseeable misuses

Any other use as the one determined under the "proper use" or any use beyond the described use shall be deemed as not in conformity and is forbidden.

Any other use has to be discussed with the manufacturer.

It is only allowed to process metal, cold and non-inflammable materials with the milling-machine.

In order to avoid misuses it is necessary to read and understand the operating instructions before the first commissioning.

The operators must be qualified.

### 1.4.1 Avoiding misuses

- ➔ Use of suitable cutting tools.
- ➔ Adapting the speed adjustment and feed to the material and workpiece.
- ➔ Clamp workpieces firmly and vibration-free.



**ATTENTION!**

The workpiece is always to be fixed by a machine vice, jaw chuck or by another appropriate clamping tool such as for the clamping claws.

**WARNING!****Risk of injury caused by workpieces flying off.**

Clamp the workpiece in the machine vice. Make sure that the workpiece is firmly clamped in the machine vice resp. that the machine vice is firmly clamped on the machine table.



- Use cooling and lubricating agents to increase the durability of the tool and to improve the surface quality.
- Clamp the cutting tools and workpieces on clean clamping surfaces.
- Sufficiently lubricate the machine.
- Correctly adjust the bearing clearance and the guidings.

It is recommended:

- Insert the drill in a way that it is exactly positioned between the three clamping jaws of the quick action chuck.
- Clamp and mills by means of the collet chuck and the corresponding collets.
- Clamp end face mills by means of shell end mill arbors.

When drilling make sure that

- the suitable speed is set depending on the diameter of the drill,
- the pressure must only be such that the drill can cut without load
- in case of too strong pressure the drill will get worn early or even might break resp. get jammed in the hole. If the drill gets jammed immediately stop the main motor by pressing the emergency stop button,
- for hard materials, e.g. steel, use commercial cooling / lubricating agents,
- generally always drive the turning spindle out of the workpiece.

**ATTENTION!**

**Do not use the quick action drill chuck for milling tools. Never clamp a milling cutter into the quick action drill chuck. Use a collet chuck and the corresponding collets for the end mill.**



When milling make sure that

- the corresponding cutting speed is selected,
  - for workpieces with normal strength values, e.g. steel 18-22 m/min,
  - for workpieces with high strength values 10-14 m/min,
  - the pressure is selected in a way that the cutting speed remains constant,
- for hard materials commercial cooling / lubricating agents are used.

**1.5 Possible dangers caused by the mill drill**

The mill drill was built using the latest technological advances.

Nonetheless there remains a residual risk, since the mill drill operates with

- at high speeds,
- with rotating parts and tools,
- with electrical voltages and currents.

We have used construction resources and safety techniques to minimize the health risk to personnel resulting from these hazards.

If the mill drill is used and maintained by the staff who are not duly qualified, there may be a risk by the drilling milling machine resulting from incorrect operation or unsuitable maintenance.



## INFORMATION

Everyone involved in the assembly, commissioning, operation and maintenance must

- be duly qualified,
- strictly follow these operating instructions.

Always disconnect the mill drill from the electrical power supply when performing cleaning or maintenance works.



## WARNING!

**The mill drill may only be used with functional safety devices.**

**Disconnect the mill drill immediately, whenever you detect a failure in the safety devices or when they are not fitted!**

**All additional devices installed by the operator have to be equipped with the prescribed safety devices.**

**This is your responsibility being the operating company!**

"Safety devices" on page 11



## 1.6 Qualification of personnel

### 1.6.1 Target group

This manual is addressed to

- the operating companies,
- the users,
- the staff for maintenance works.

Therefore, the warning notes refer to both, operation and maintenance staff of the mill drill.

Disconnect the mill drill always from the electrical power supply. This will prevent it from being used by unauthorized staff.

The qualifications of the staff for the different tasks are mentioned below:



#### Operator

The operator is instructed by the operating company about the assigned tasks and possible risks in case of improper behaviour. Any tasks which need to be performed beyond the operation in the standard mode must only be performed by the operator if it is indicated in these instructions and if the operating company expressly commissioned the operator.

#### Electrical specialist

Due to his professional training, knowledge and experience as well as his knowledge of respective standards and regulations the electrical specialist is able to perform works on the electrical system and to recognise and avoid any possible dangers himself.

The electrical specialist is specially trained for the working environment in which he is working and knows the relevant standards and regulations.

#### Specialist staff

Due to his professional training, knowledge and experience as well as his knowledge of relevant regulations the specialist staff is able to perform the assigned tasks and to recognise and avoid any possible dangers himself.

#### Instructed persons

Instructed persons were instructed by the operating company about the assigned tasks and any possible risks in case of improper behaviour.



## INFORMATION

Everyone involved in the assembly, commissioning, operation and maintenance must

- be duly qualified,
- strictly follow these operating instructions.

In the event of improper use

- there may be a risk to the staff,
- there may be a risk to the drilling milling machine and other material values,
- the correct function of the mill drill may be affected.



### 1.7 Operator positions

The operator's position is in front of the mill drill.

### 1.8 Safety measures during operation

#### CAUTION!

**Risk due to inhaling of health hazardous dusts and mist.**

Dependent on the material which need to be processed and the used auxiliaries dusts and mist may be caused which might impair you health.

Make sure that the generated health hazardous dusts and mist are safely sucked off at the point of origin and is dissipated or filtered from the working area. To do so, use a suitable extraction unit.



#### CAUTION!

**Risk of fire and explosion by using flammable materials or cooling lubricants.**

Before processing inflammable materials (e.g. aluminium, magnesium) or using inflammable auxiliary materials (e.g. spirit) it is necessary to take additional preventive measures in order to safely avoid health risks.



### 1.9 Safety devices

Use the mill drill only with properly functioning safety devices.

Stop the mill drill immediately if there is a failure on the safety device or if it is not functioning for any reason.

It is your responsibility!

If a safety device has been activated or has failed, the mill drill must only be used if you

- have removed the cause of the failure,
- have verified that there is no danger resulting for the staff or objects.

#### WARNING!

**If you bypass, remove or deactivate a safety device in any other way, you are endangering yourself and other staff working with the mill drill. The possible consequences are**

- injuries may occur due to workpiece or parts of workpieces flying off,
- contact with rotating parts,
- fatal electrocution.

The mill drill includes the following safety devices:

- an EMERGENCY STOP push button,
- a protective cover on the drilling / milling head.
- a separating protective device on the milling spindle,





## WARNING!

The separating protective equipment which is made available and delivered together with the machine is designed to reduce the risk of workpieces or fractions of them which being expelled, but not to remove them completely. Always work carefully and observe the limit values of your chipping process.



### 1.9.1 EMERGENCY-STOP push button

The EMERGENCY STOP push button switches off the mill drill.

☞ "Switching on the mill drill" on page 25

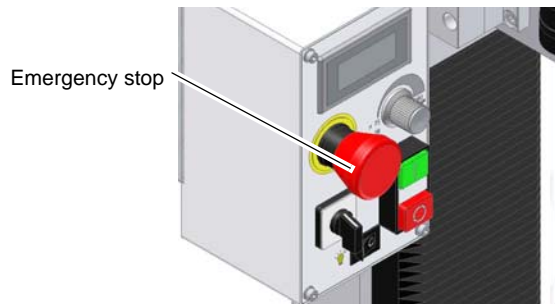


Fig.1-1: EMERGENCY-STOP push button

## ATTENTION!

The emergency stop push button stops the mill drill the moment it is activated.

Press the EMERGENCY STOP push button only if there is a risk! If this push button is actuated in order to switch off the mill drill in the standard operation the tool or workpiece might get damaged.

After having actuated the EMERGENCY STOP, turn the knob of the particular push button to the right in order to restart the machine.



### 1.9.2 Protective cover

The drilling / milling head is equipped with a protective cover.

## WARNING!

Only remove the protective cover when the mains plug of the mill drill is disconnected.

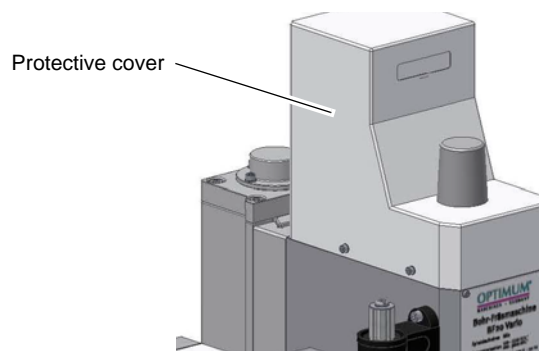


Fig.1-2: Protective cover





### 1.9.3 Separating protective equipment

Adjust the protective equipment to the correct height before you start working. To do so, detach the clamping screw, adjust the required height and re-tighten the clamping screw.

A switch is integrated in the fixture of the spindle protection which monitors that the cover is closed.

#### INFORMATION

You cannot start the machine if the protective guard is not closed.



Fig. 1-3: Protective guard

### 1.10 Safety check

Check the mill drill in regular intervals.

Check all safety devices

- before each operation,
- once a week (with the machine in operation),
- after every maintenance and repair work.

General check		
Equipment	Check	OK
Protective covers	Mounted, firmly bolted and not damaged	
Signs, Markings	Installed and legible	

Functional check		
Equipment	Check	OK
EMERGENCY-STOP push button	When the EMERGENCY-STOP button is activated, the mill drill should switch off. Make sure that it is only possible to restart the machine if the EMERGENCY STOP push button is unlocked and the ON switch was activated.	
Separating protective equipment around the drilling milling spindle	The mill drill may switch on only when the safety device is closed.	



## 1.11 Personal protective equipment

For certain work personal protective equipment is required.

Protect your face and your eyes: Wear a safety helmet with facial protection when performing works where your face and eyes are exposed to hazards.



Use protective gloves when handling pieces with sharp edges.



Use safety shoes when you assemble, disassemble or transport heavy components.



Use ear protection if the noise level in the workplace exceeds 80 dB (A).

Before starting work make sure that the prescribed personnel protective equipment is available at the working place.



### CAUTION!

**Dirty or contaminated personnel protective equipment can cause diseases. Clean it each time after use and once a week.**



## 1.12 For your own safety during operation

### WARNING!

**Before activating the mill drill assure yourself that this will neither endanger other personnel nor cause damage to equipment.**



Avoid any unsafe working practices:

- The instructions mentioned in these operating instructions have to be strictly observed during assembly, operation, maintenance and repair.
- Wear safety goggles.
- Switch off the mill drill before measuring the workpiece.
- Do not work on the mill drill, if your concentration is reduced, for example, because you are taking medication.
- Stay on the mill drill until the working spindle has come to a complete standstill.
- Use the prescribed personnel protective equipment. Make sure to wear a well-fitting work suit and, if necessary, a hairnet.
- Do not use protective gloves when drilling or milling.
- Disconnect the shock-proof plug from the outlet before replacing the tool.
- Use appropriate auxiliary materials to remove drilling and milling chips.
- Make sure that nobody is endangered by your work.
- Safely and firmly clamp the workpiece before switching on the mill drill.

We specially point out the specific dangers when working with and on the mill drill.

## 1.13 Switching-off and securing the mill drill

Unplug the electrical power before starting any maintenance or repair work.



## 1.14 Using lifting equipment

### WARNING!

**The use of unstable lifting and load suspension gear that might break under load can cause severe injuries or even death. Check that the lifting equipment and load-suspension gears are of sufficient load capacity and are in perfect condition.**



**Observe the accident prevention regulations issued by OSHA or other competent supervisory authority. Fasten the loads properly. Never walk under suspended loads!**



## 2 Technical data

The following information are the dimensions and indications of weight and the manufacturer's approved machine data.

<b>2.1</b>	<b>Power Supply</b>	
	Motor	1.2 HP, 115V, 1 Ph, 60 Hz
<b>2.2</b>	<b>Drilling-milling capacity</b>	
	Drilling capacity	14 mm/ 0.5" max. diam.
	Milling capacity of end-mill cutter	16 mm/ 0.6" max. diam.
	Milling capacity of inserted tooth cutter	40 mm/ 1.6" max. diam.
	Swing	370 mm/ 14.6"
<b>2.3</b>	<b>Spindle holding fixture</b>	
	Spindle holding fixture	MT2 w/ 3/8"-16 draw bar
	Quill travel	50 mm/ 2.0"
<b>2.4</b>	<b>Mill drill head</b>	
	Swivelling	+ / - 90°
	Reduction stages	2
	Z-axis travel	280 mm/ 11"
<b>2.5</b>	<b>Cross table</b>	
	Table length	500 mm/ 19.7"
	Table width	180 mm/ 7.0"
	Y-axis travel	175 mm/ 6.9"
	X-axis travel	280 mm/ 11.0"
	T - slot	1/2" slots, three
<b>2.6</b>	<b>Dimensions</b>	
	Height	935 mm/ 36.8"
	Depth	565 mm/22.3"
	Width	745 mm/ 29.3"
	Total weight	440 Kg./ 227 lbs
<b>2.7</b>	<b>Work area</b>	
	Height	2,000 mm/ 78.7"
	Depth	2,200 mm/ 86.6"
	Width	1500 mm/ 59.0"
<b>2.8</b>	<b>Speeds</b>	
	Reduction stage slow	90 - 1,500 RPM



Reduction stage fast	150 - 3,000 RPM
<b>2.9 Environmental conditions</b>	
Temperature	5 - 35 °C/ 40 - 95 F
Humidity	25 - 80%
<b>2.10 Service material</b>	
Reduction stage Blank steel parts	628 Mobil /Vis. 100/150), Mobilux EP 004, or Mobil XHP acid-free oil, motor oil

## 2.11 Emissions

The emission of the mill drill is below 80 dB(A).

If the mill drill is installed in an area where various machines are in operation, the noise exposure (immission) on the operator of the mill drill at the working place may exceed 80dB(A).

### INFORMATION

This numerical value was measured on a new machine under proper operating conditions. Depending on the age respectively on the wear of the machine it is possible that the noise behaviour of the machine changes.

Furthermore, the factor of the noise emission is also depending on manufacturing influencing factors, e.g. speed, material and clamping conditions.



### INFORMATION

The mentioned numerical value is the emission level and not necessarily a safe working level.

Though there is a dependency between the degree of the noise emission and the degree of the noise disturbance it is not possible to use it reliably to determine if further precaution measures are required or not.

The following factors influence the actual degree of the noise exposure of the operator:

- Characteristics of the working area, e.g. size or damping behaviour,
- Other noise sources, e.g. the number of machines,
- Other processes taking place in the proximity and the period of time during which the operator is exposed to the noise.

Consult OSHA, state and local regulations in order to determine compliance, dangers and risks to the operator.

### CAUTION!

**Depending on the overall noise exposure and the basic limit values the machine operators must wear an appropriate hearing protection.**

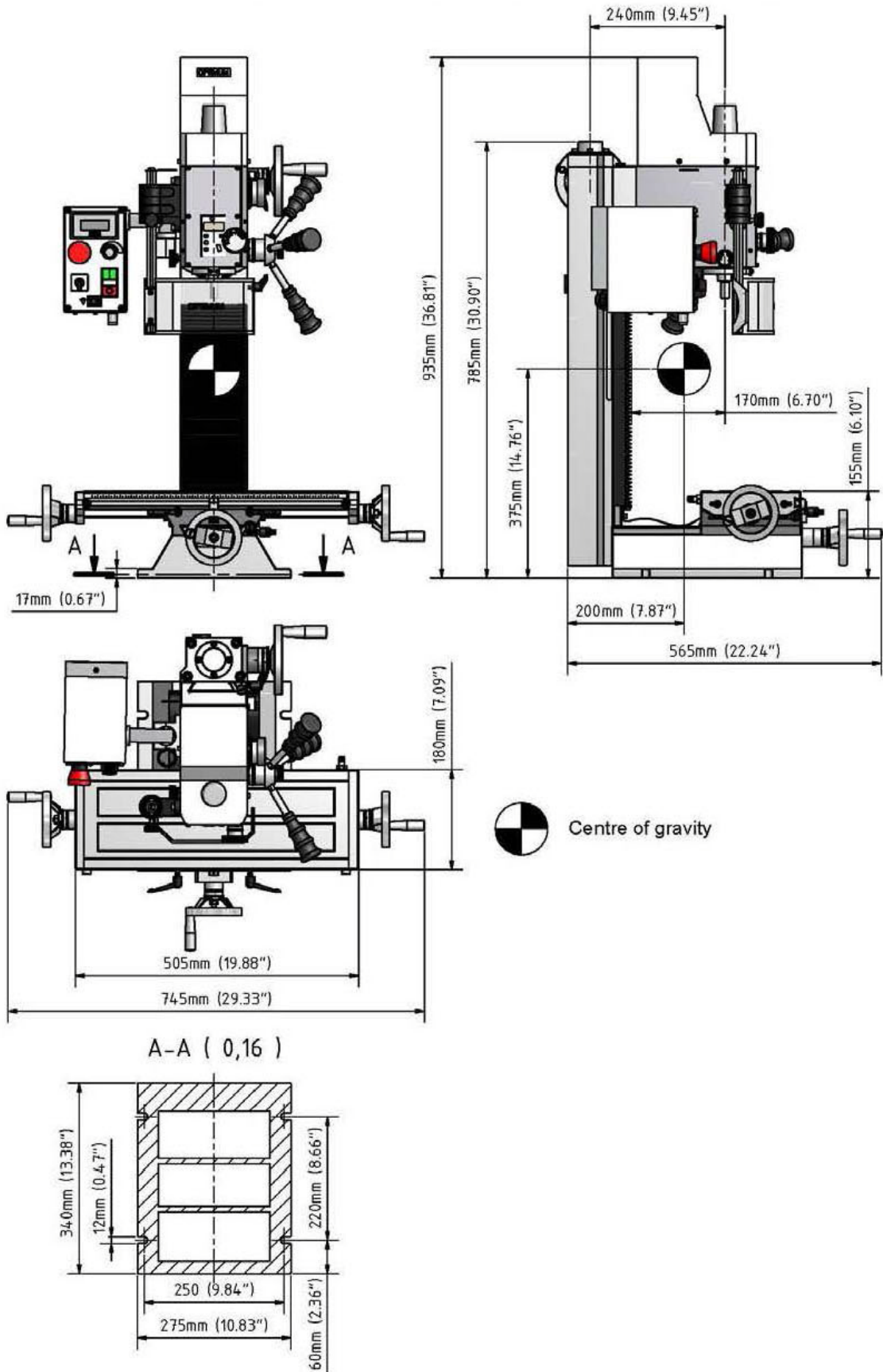
**We generally recommend to use a noise protection and a hearing protection.**







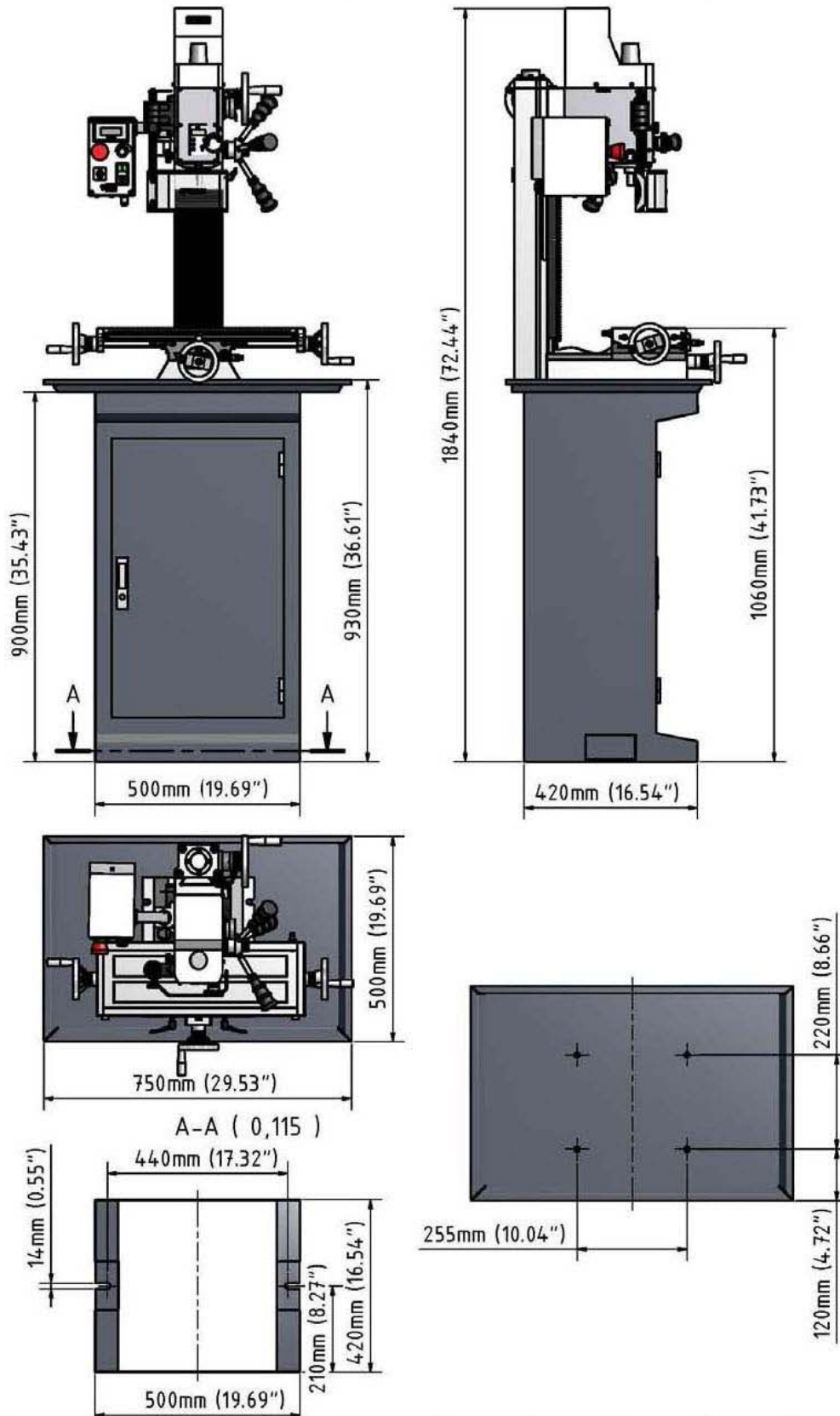
## 2.12 Dimensions, installation plan BF20V



Img.2-1: installation plan BF20V



## 2.13 Installation plan of optional stand



Img.2-2: installation plan stand 3353003



### 3 Unpacking and connecting

#### INFORMATION

The mill drill is pre assembled.



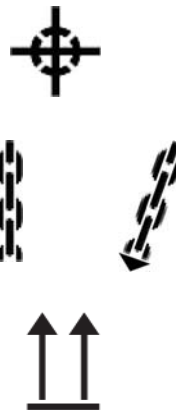
#### 3.1 Scope of delivery

Check immediately upon delivery of the mill drill if there are any transport damages or loosened fastening screws.

Compare the scope of delivery with the packing list.

#### 3.2 Transport

- Centres of gravity
- Load suspension point  
(Marking of the positions for the load suspension gear)
- Prescribed transportation position  
(Marking of the top surface)
- Means of transport to be used
- Weights



#### WARNING!

Severe or fatal injuries may occur if parts of the machine tumble or fall down from the forklift truck or from the transport vehicle. Follow the instructions and information on the transport case.



#### WARNING!

The use of unstable lifting and load suspension gear that might break under load can cause severe injuries or even death. Check that the lifting and load suspension gear has sufficient load capacity and that it is in perfect condition.

Observe the accident prevention regulations issued by OSHA or other competent supervisory authority, responsible for your company.

Fasten the loads properly.

**Never walk under suspended loads!**





## 3.3 Storage

### ATTENTION!

In case of wrong and improper storage electrical and mechanical machine components might get damaged and destroyed.

Store packed and unpacked parts only under the intended environmental conditions.

Follow the instructions and information on the transport case.



- Fragile goods  
(Goods require careful handling)



- Protect against moisture and humid environment  
☞ "Environmental conditions" on page 16



- Prescribed position of the packing case  
(Marking of the top surface - arrows pointing to the top)



- Maximum stacking height

Example: not stackable - do not stack a second packing case on top of the first one.



## 3.4 Installation and assembly

### 3.4.1 Requirements regarding the installation site

Organize the working area around the mill drill according to the local safety regulations.

### INFORMATION

In order to attain good functionality and a high processing accuracy as well as a long durability of the machine the installation site should fulfil certain criteria.



**Please observe the following points:**

- The device must only be installed and operated in a dry and well-ventilated place.
- Avoid places nearby machines generating chips or dust.
- The installation site must be free from vibrations also at a distance of presses, planing machines, etc.
- The stand must be suitable for the mill drill. Also make sure that the floor has sufficient load bearing capacity and is level.
- The stand must be prepared in a way that possibly used coolant cannot penetrate into the floor.
- Any parts sticking out such as stops, handles, etc. have to be secured by measures taken by the customer if necessary in order to avoid endangerment of persons.
- Provide sufficient space for the staff preparing and operating the machine and transporting the material.



- Also consider that the machine is accessible for setting and maintenance works.
- Provide for sufficient illumination (Minimum value: 47 lumens/FT<sup>2</sup>, measured at the tool tip). At insufficient intensity of illumination an additional illumination has to be ensured e.g. by means of a separate workplace lamp.

## INFORMATION

The electrical power of the mill drill must be freely accessible.



### 3.4.2 Load suspension point

#### WARNING!

Danger of crushing and tilting. Proceed carefully when lifting, installing and assembling the machine.



- Fix the load lifting gear around the mill drill head. Use a lifting sling for this purpose. lifting sling.
- Firmly clamp all clamping levers on the mill drill before lifting the mill drill.
- Make sure that the load attachment does not cause damage to components or paint.

### 3.4.3 Assembly

- Check if the underground of the mill drill is level using a spirit level.
- Check if the underground is sufficiently stable and rigid. The total weight is 440 Kg./ 227 lbs.

#### ATTENTION!

**Insufficient rigidity of the foundation leads to the superposition of the vibrations of the mill drill and of the underground (natural frequency of components). Critical speeds and moves in the axis with displeasing vibrations are rapidly achieved in case of insufficient rigidity of the whole system and will lead to bad milling results.**



- Place the mill drill on the provided underground.
- Fix the mill drill in the provided through-holes on the machine foot.

#### WARNING!

**The condition of the underground and the fixing type of the machine foot to the underground must be in a way that it can bear the loads of the mill drill. The underground must be level. Check if the underground of the mill drill is level using a spirit level.**



Fix the foot of the mill drill to the stand with the provided through-holes. When using an optionally available machine stand, it also needs to be anchored safely and firmly. We recommend you to use shear connector cartridges resp. heavy-duty anchors.

- ☞ "Dimensions, installation plan BF20V" on page 17,
- ☞ "Installation plan of optional stand" on page 18.

## 3.5 First commissioning

#### ATTENTION!

**Before commissioning the machine check all screws, fixtures resp. safety devices and tighten up the screws if necessary!**



#### WARNING!

**Risk by using improper tool holders or operating them at inadmissible speeds.**

**Only use the tool holders (e.g. drill chuck) which were delivered with the machine or which are offered as optional equipment.**



**Only use tool holders in the intended admissible speed range.**



It is only allowed to modify tool holding fixtures in compliance with the recommendations of OPTIMUM or the manufacturer of the clamping device.

## WARNING!

When first commissioning the mill drill by inexperienced staff you endanger people and the machine.

We do not take any liability for damages caused by incorrectly performed commissioning.

☞ "Qualification of personnel" on page 10



### 3.5.1 Power supply

#### CAUTION !

Lay the connection cable of the machine so that a stumble of persons is prevented.

- ➔ Connect the electrical supply cable.
- ➔ Check the fusing (fuse) of your electrical supply according to the technical instructions regarding the total connected power of the mill drill.



### 3.5.2 Cleaning and lubricating

- ➔ Remove the anti-corrosive agents on the mill drill which had been applied for transportation and storage. Therefore, we recommend the use of mineral spirits with a soft cloth.
- ➔ Do not use any solvents, cellulose thinner or any other cleaning agents which might affect the coating of the mill drill when cleaning the machine. Observe the indications and notes of the manufacturer for cleaning agents.
- ➔ Oil all blank machine parts using an acid-free lubricating oil.
- ➔ Lubricate the mill drill according to the lubricating plan.  
☞ "Inspection and maintenance" on page 33
- ➔ Check if all spindles are running smoothly. The spindle nuts are re-adjustable.
- ➔ Disassemble the V-ledges of the cross table and clean the ledges from the anti-corrosive agent. ☞ "V-ledges" on page 34

### 3.5.3 Warming up the machine

#### ATTENTION!

If the mill drill and in particular the milling spindle is immediately operated at maximum load when it is cold it may result in damages.

If the machine is cold such as e.g. directly after having transported the machine it should be warmed up at a spindle speed of only 500 1/min for the first 30 minutes.



### 3.6 Optional accessories

Description	Item No
Machine stand	335 3003
Collet chuck kit 3/32" - 5/8" 10-pcs (ER25)	335 2157
MT2, 3/8"-16 Collet Set 1/8 - 7/16"	335 2159
Quick-action drill chuck (0-13mm) B16	305 0626
Morse taper taper mandrel MT2 / JT33, 3/8"-16	305 0671
4" Precision Modular Vise	335 5551



## 4 Operation

### 4.1 Safety

Commission the mill drill only under the following conditions:

- The mill drill is in proper working order.
- The mill drill is used as prescribed.
- The operating manual is followed.
- All safety devices are installed and activated.

All failures should be eliminated immediately. Stop the mill drill immediately in the event of any problem in operation and make sure it cannot be start up accidentally or without authorisation.

☞ "For your own safety during operation" on page 14



### 4.2 Control and indicating elements

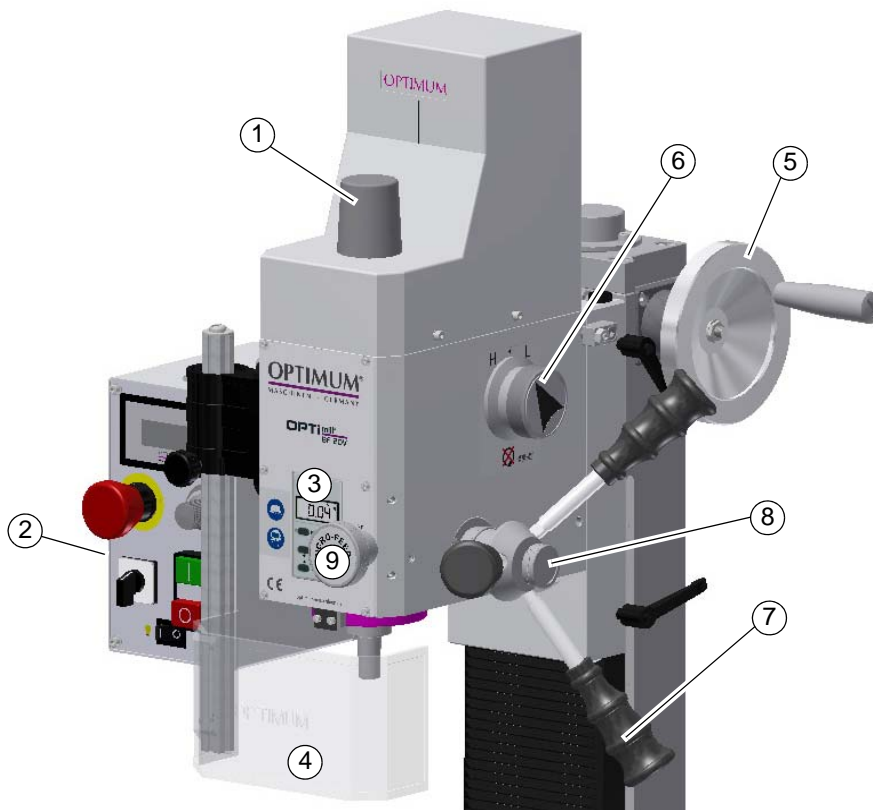


Fig.4-1: mill drill

Pos.	Description	Pos.	Description
1	Cover of draw-in rod	2	Control panel
3	Digital display fine feed of spindle	4	Spindle protection
5	Crank for height adjustment of the mill drill head	6	Selector switch for reduction stage
7	Star grip for spindle feed	8	Activation of the fine feed
9	Fine adjustment of spindle		





## 4.2.1 Control panel



Fig. 4-2: control panel, front view

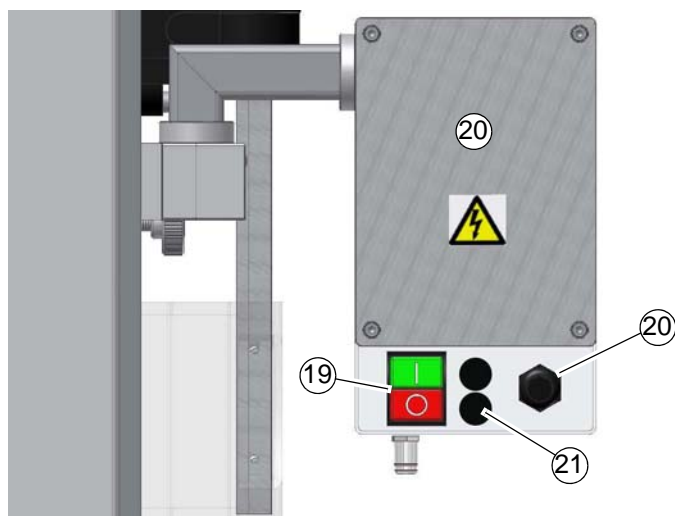


Fig. 4-3: Control panel, back

Pos.	Description	Pos.	Description
10	Clamping screw of spindle quill	11	Digital display speed
12	EMERGENCY-STOP	13	Speed control
14	Push button Start	15	Change-over switch
16	Machine lighting	17	Push button Stop
18	Digital display fine crossfeed of spindle sleeve	19	Main switch
20	Control	21	115V voltage supply
22	Fuse		





### Main switch

Switches the voltage supply on.  
The main switch is at the back of the control panel.



### Hand-actuated auxiliary switch Start / Stop

Switches the machine on or off.



### Turning direction

For selection of right-handed rotation, left-handed rotation or off position. Select the turning direction before switching on the machine with the push button.



### Speed

Potentiometer for setting the required speed. The speed and thus the cutting speed of the material of the workpiece, of the cutter diameter and of the type of cutter.

The electronics controls the speed slowly to the target value with a ramp. Therefore, wait a while before you continue milling or drilling with the feed.



### Reduction stage

Rotary-type switch to select the reduction stage.



### ATTENTION!

**Wait until the mill drill has come to a complete halt, before performing any changes on the gear switch.**

- Turn the gear switch to the position "H" for a speed range from approx. 150 - 3,000 RPM rpm.
- Turn the gear switch to the position "L" for a speed range from approx. 90 - 1,500 RPM rpm.



### 4.3 Switching on the mill drill

- Switch on the main switch.
- Select the gear level.
- Choose rotational direction.
- Set the potentiometer to the lowest speed.
- Close spindle protection system.
- Actuate push button "Start".
- Set the required speed on the potentiometer.

### 4.4 Switching off the mill drill

- Press the hand-actuated auxiliary switch Stop. During long-term standstill switch the turning direction switch to the zero position.



## 4.5 Inserting a tool

### 4.5.1 Installation

#### CAUTION!

When milling operations are performed the cone seat has to be fixed always to the draw-in rod. Any cone connections with the taper bore of the work spindle without using the draw-in rod are not allowed for milling operations. The cone connection should be released by the lateral pressure. Injuries may be caused by parts flying off.



The mill head is equipped with a 10mm draw-in rod.

- ➔ Remove the cover.
- ➔ Clean the seat in the milling spindle / spindle quill.
- ➔ Clean the taper of your tool.
- ➔ Insert the tool into the holding fixture / spindle quill.

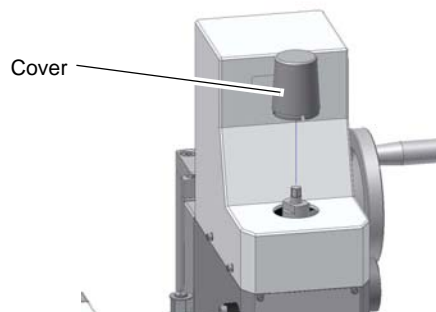


Fig. 4-4: Mill drill head

- ➔ Screw the draw-in rod into the tool.
- ➔ Tighten the tool with the draw-in rod and hold the spindle onto the end support with a key.

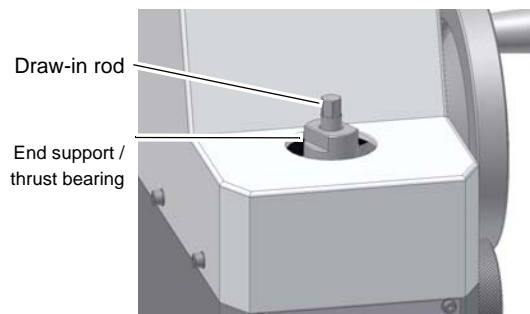


Fig. 4-5: Mill drill head

### 4.5.2 Disassembly

- ➔ Hold the spindle thrust bearing with a wrench and loosen the draw-in rod 2-3 turns. Tap top of draw rod with hammer to loosen the tool from the cone. Turn the draw-in rod further, so that the tool is released completely from the cone.

#### ATTENTION!

When installing a cold Morse taper into a heated-up machine those MT seats tend to shrink on the Morse taper versus quick-release tapers.

### 4.5.3 Use of collet chucks

When using collet chucks to hold milling tools, a higher operation tolerance can be achieved. The exchange of the collet chucks for a smaller or larger end mill cutter is done in a simple and rapid way and it is not necessary to disassemble the complete tool. The collet chuck is pressed into the ring of the swivel nut and has to rest there by itself. The milling cutter is clamped by fastening the swivel nut on the tool.

Make sure that the correct collet chuck is used for each milling cutter diameter, so that the milling cutter may be fastened securely and firmly.

☞ "Optional accessories" on page 22



#### 4.6 Clamping the workpieces

##### CAUTION!

Injury by parts flying off.

The workpiece always needs to be fixed by a machine vice, a jaw chuck or by other appropriate clamping tools such as clamping claws.



#### 4.7 Changing the speed range

##### ATTENTION!

Wait until the mill drill has come to a complete halt, before performing any changes on the gear switch.

- Select gear level  
H = rapid  
L = low
- Adjust the speed with the potentiometer. The speed and thus the cutting speed depends on the material of the workpiece, the milling cutter diameter and the cutter type.

Selector switch gear stage  
H = rapid  
L = low



Fig.4-6: Drilling and milling head



#### 4.8 Selecting the speed

For milling operations, the essential factor is the selection of the correct speed. The speed determines the cutting speed of the cutting edges which cut the material. By selecting the correct cutting speed, the service life of the tool is increased and the working result is optimised.

The optimum cutting speed mainly depends on the material and on the material of the tool. With tools (milling cutters) made of hard metal or ceramic insert it is possible to work at higher speeds than with tools made of high-alloyed high-speed steel (HSS). You will achieve the correct cutting speed by selecting the correct speed.

In order to determine the correct cutting speed for your tool and for the material to be cut, you may refer to the following standard values or a table reference book (e.g. Machinery's Handbook ISBN 0-8311-2424-5, Insert Pgs. 30a & 30b (attached)).

The required speed is calculated as follows:

$$N = \frac{12V}{\pi \times D} = 3.82 \frac{V}{D}$$



## 4.8.1 Standard values for cutting speeds

[FPM] with high-speed steel and hard metal in conventional milling

Tool	Steel	Grey Cast Iron	Age-Hardened Al alloy
Peripheral and side milling (FPM)	33 - 82	33 - 72	492 - 1,148
Relieved form cutters (FPM)	49 - 79	33 - 66	492 - 820
Inserted tooth cutter with SS (FPM)	49 - 79	39 - 82	656 - 984
Inserted tooth cutter with HM (FPM)	328 - 656	98 - 328	984 - 1,312

Given below are standard values for speeds depending on the milling cutter diameter, cutter type and material.

Tool diameter (in.) Peripheral and side milling cutters	Steel	Grey Cast Iron	Age-Hardened Al alloy
	33 - 82 FPM	33 - 72 FPM	492 - 1,148 FPM
	Speed (RPM)		
1.378"	91 - 227	91 - 200	1,365 - 3,185
1.575"	80 - 199	80 - 175	1,195 - 2,790
1.772"	71 - 177	71 - 156	1,062 - 2,470
1.969"	64 - 159	64 - 140	955 - 2,230
2.165"	58 - 145	58 - 127	870 - 2,027
2.362"	53 - 133	53 - 117	795 - 1,860
2.559"	49 - 122	49 - 108	735 - 1,715

Tool diameter (in.) Form cutters	Steel	Grey Cast Iron	Age-Hardened Al alloy
	49 - 79 FPM	33 - 66 FPM	492 - 820 FPM
	Speed (RPM)		
0.1575"	1,194 - 1,911	796 - 1,592	11,900 - 19,000
0.1969"	955 - 1,529	637 - 1,274	9,550 - 15,900
0.2362"	796 - 1,274	531 - 1,062	7,900 - 13,200
0.3150"	597 - 955	398 - 796	5,900 - 9,900
0.3937"	478 - 764	318 - 637	4,700 - 7,900
0.4724"	398 - 637	265 - 531	3,900 - 6,600
0.5512"	341 - 546	227 - 455	3,400 - 5,600
0.6299"	299 - 478	199 - 398	2,900 - 4,900



## 4.8.2 Standard values for speeds with HSS – Eco – twist drilling (U.S. unit)

Material		Cutter Diameter (in.)									Coolant <sub>3</sub>
		0,0787	0,1181	0,1575	0,1969	0,2362	0,2756	0,3150	0,3543	0,3937	
Steel, unalloyed, up to 87,000 PSI	n <sup>1</sup>	5.600	3.550	2.800	2.240	2.000	1.600	1.400	1.250	1.120	E
	f <sup>2</sup>	0,0016	0,0025	0,0031	0,0039	0,0049	0,0049	0,0063	0,0063	0,0079	
Structural steel, alloyed, quenched and sub-drawn, up to 130,000 PSI	n	3.150	2.000	1.600	1.250	1.000	900	800	710	630	E/Oil
	f	0,0013	0,002	0,0025	0,0031	0,0039	0,0039	0,0049	0,0049	0,0063	
Structural steel, alloyed, quenched and sub-drawn, up to 174,000 PSI	n	2.500	1.600	1.250	1.000	800	710	630	560	500	Oil
	f	0,0013	0,0016	0,0020	0,0025	0,0031	0,0039	0,0039	0,0049	0,0049	
Stainless steels up to 130,000 PSI e.g., X5CrNi18 10	n	2.000	1.250	1.000	800	630	500	500	400	400	Oil
	f	0,0013	0,0020	0,0025	0,0031	0,0039	0,0039	0,0049	0,0049	0,0063	

1: Speed (n) in RPM

2: Feed Rate (f) in./rev.

3: Coolant: E = Emulsion; Oil = Cutting oil

- The above mentioned indications are standard values. In some cases it may be advantageous to increase or decrease these values.
- When drilling a cooling or lubricating agent should be used.
- For stainless materials (e.g. VA – or NIRO steel sheets) do not center as the material would compact and the drill bit will become rapidly blunt.
- The workpieces need to be tensed in flexibly and stably (vice, screw clamp).

### INFORMATION

High temperatures are generated at the tip of the tool by the occurring friction heat. The tool should be cooled during the milling process. Cooling the tool with a suitable cooling lubricant ensures better working results and a longer edge life of the cutting tool.



### INFORMATION

Use a water-soluble and non-pollutant emulsion as a cooling agent. This can be acquired from authorised distributors.



Make sure that the cooling agent is properly retrieved. Respect the environment when disposing of any lubricants and coolants. Follow the manufacturer's disposal instructions.





## 4.9 Manual spindle feed with the fine feed

- Turn the handle screw.
- The spindle lever will move towards the mill drill head and will activate the clutch of the fine feed.
- Turn the spindle sleeve fine feed in order to move the spindle quill.

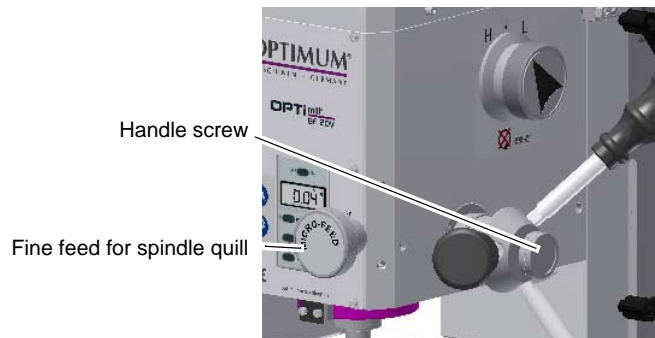
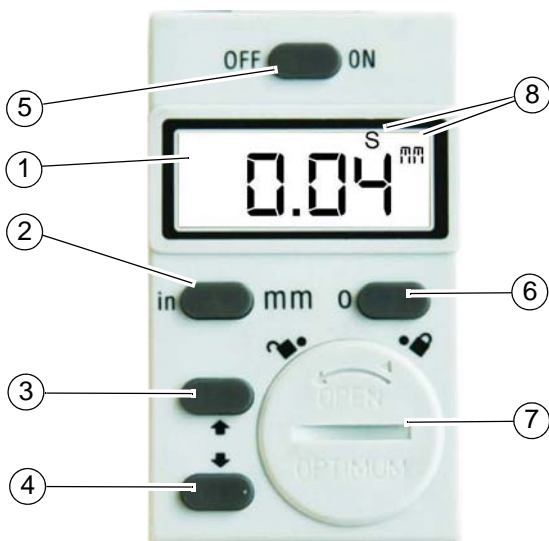


Fig.4-7: Fine feed

## 4.10 Digital display for spindle travel

Measuring range	0 - 999.99mm 0 - 39.371"inch
Reading precision	0.01mm 0.0004"inch
Power supply	round cell CR2032 , 3 V 20 x 3,2mm



Pos.	Description
1	LCD display
2	Shifting mm/inch
3	Performs a value increase in operating mode "S" (Setting)
4	Performs a value decrease in operating mode "S" (Setting)
5	ON/OFF switch
6	Zero position and activation of operation mode "S"
7	Battery compartment
8	Display of operation mode "S" and selected unit "mm / inch"



## Operation mode "S"

The operation mode "S" is used to enter and to compensate the backlash of quill mechanism.

- (1) Display which shows the operating modes "S", "inch" or "mm"
- (2) converts the measuring unit from *millimetres* to *inches* and vice versa.
- (3) ▲, Value increase in operation mode "S"
- (4) ▼, Value decrease in operation mode "S"
- (5) Switches the display ON or OFF.
- Resets the display to the set compensation value "S".

### Enter the offset value of the quill mechanism

- ➔ Press the button (6) for about 2-3 seconds. The operation mode (8) "S" is activated and displayed.
- ➔ Enter the offset value of a quill mechanism, based on your experience with the keys (3) or (4).
- ➔ Stop the operation mode "S" by pressing the button (6) again.

### INFORMATION

Before inserting the new battery, wait about 30 seconds. Please make sure, that the contacts are metallicly bright and free from coverings which result from bleeding or gassing batteries. Grip the new batteries only with plastic forceps, if possible not with the hand due to the formation of oxide and never with metal forceps in order to avoid a short circuit. In most cases the round cell will be inserted into the digital display with the marking upside. After inserting the round cell, the battery compartment has to be closed again.



### 4.10.1 Troubleshooting

Problem	Cause / possible effects	Solution
Flashing of the display	<ul style="list-style-type: none"> <li>• Voltage too low</li> </ul>	<ul style="list-style-type: none"> <li>• Change battery</li> </ul>
Screen doesn't refresh	<ul style="list-style-type: none"> <li>• Operation mode "S" is active</li> <li>• Disturbance in the circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Disable the operation mode "S".</li> <li>• Remove the battery, wait 30 seconds and reinsert the battery.</li> </ul>
No data visible	<ul style="list-style-type: none"> <li>• No power supply</li> <li>• Battery voltage less than 3V</li> </ul>	<ul style="list-style-type: none"> <li>• Clean battery contacts</li> <li>• Replace battery</li> </ul>

### 4.11 Manual spindle feed with the spindle quill lever

#### ATTENTION!

The clutch of the fine feed has to be disengaged before the spindle quill lever can be used. Activating the spindle quill lever when the fine feed is engaged may damage the clutch.

- ➔ Loosen the handle screw Fig.4-7: "Fine feed" on page 30 .  
The spindle quill lever moves away from the mill drill head and disengages the clutch of the fine feed.





## 4.12 Swivelling the mill drill head

The mill drill head may be swivelled to the right and to the left. Two clamping screws need to be loosened.

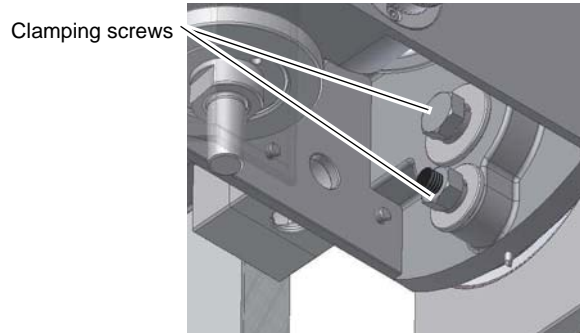


Fig. 4-8: Clamping screws

### CAUTION!

**If the screws are completely unfastened, the milling head might fall down.**

**When tilting the working head, only unfasten the screws as far as necessary to be able to perform the settings. After having set the tilt angle, retighten the clamping screws.**



### 4.12.1 Shifting the mill drill head

The column of the mill drill head can be shifted each to the left or to the right.

Use the option of shifting if you need to swivel the mill drill head to the left or to the right for working.





## 5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the mill drill.

### ATTENTION !

Properly performed regular maintenance is an essential prerequisite for

- operational safety,
- failure-free operation,
- long service life of the mill drill and
- the quality of the products manufactured.



Installations and equipment from other manufacturers must also be in good order and condition.

### 5.1 Safety

#### WARNING!

The consequences of incorrect maintenance and repair work may include:

- very serious injury to personnel working on the mill drill,
- damage to the mill drill.



Only qualified staff should carry out maintenance and repair work on the mill drill.

#### 5.1.1 Preparation

##### WARNING!

Only carry out work on the mill drill if it has been disconnected from the electric power supply.



☞ "Switching-off and securing the mill drill" on page 14

Attach a warning sign.



#### 5.1.2 Restarting

Before restarting run a safety check.

☞ "Safety check" on page 13

##### WARNING!

Before starting the mill drill, you must check that there is no danger for persons and that the mill drill is not damaged.

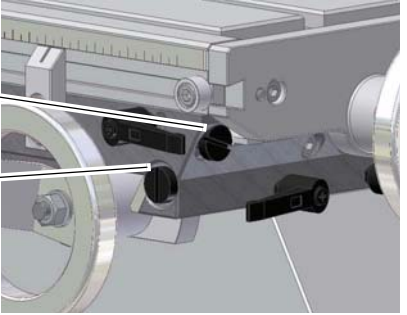



### 5.2 Inspection and maintenance

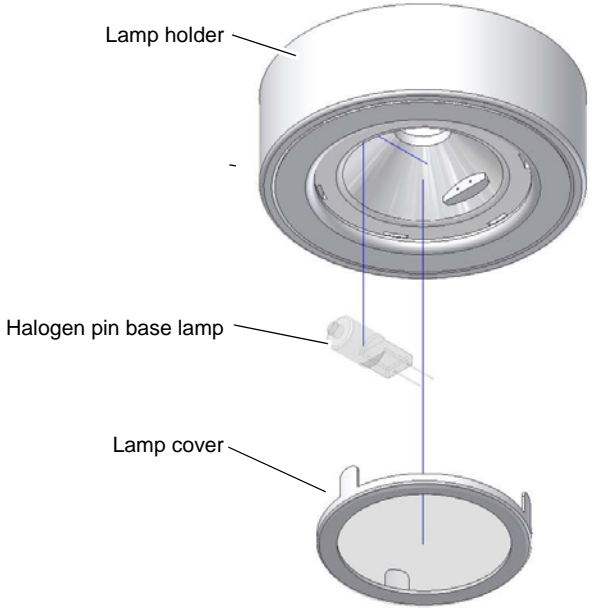
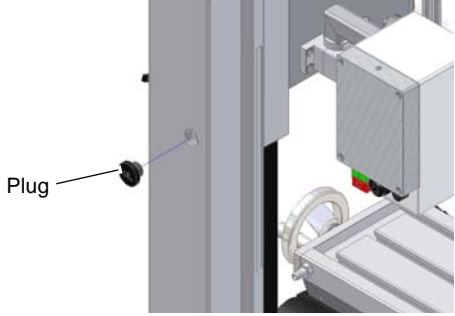
The type and level of wear depends to a large extent on the individual usage and operating conditions. For this reason, all of the intervals are only valid for the authorised conditions.

Interval	Where?	What?	How?
Start of work, after every maintenance or repair work	Mill drill	→ ☞ "Safety check" on page 13	

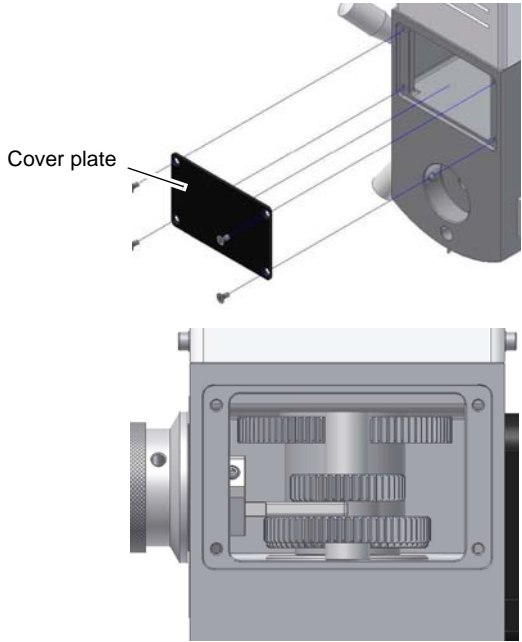


Interval	Where?	What?	How?
Start of work, after every maintenance or repair work	Dovetail guides	Oiling	→ Lubricate all slideways.
Every week	Cross table	Oiling	→ Oil all bare steel surfaces. Use an acid-free oil, e.g. engine oil.
As required	Spindle nuts	Readjusting	An extended clearance in the spindles of the cross table can be reduced by readjusting the spindle nuts. Refer to spindle nuts position 66 and 71 The spindle nuts are readjusted by reducing the flank of screw thread of the spindle nut with an adjusting screw. After readjusting a smooth running move over the entire tool path is assured, the wear by friction between spindle nut /spindle is reduced considerably.
As required	V-ledges	Readjusting X and Y axis	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Cross table</p> <p>Take-up screw taper gib X axis</p> <p>Take-up screw taper gib Y axis</p> </div>  </div> <p style="text-align: center;">Fig.5-1: Cross table</p> <p>→ Turn the take-up screw of the corresponding V-ledge clockwise. The taper gib continues to push in and reduced by it the gap in the guide way.</p> <p>→ Check the settings. The corresponding guideway must be more easily moveable but ensure a stable guiding.</p>
As required	V-ledges	Readjusting Z axis	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>Take-up screw taper gib Z axis</p> </div>  </div> <p style="text-align: center;">Fig.5-2: Milling head</p> <p>→ Proceed as described under "Readjusting X and Y axis".</p>



Interval	Where?	What?	How?
As required	<b>Machine illumination</b>	Replacing the halogen lamp	 <p style="text-align: center;">Fig.5-3: Replacing the halogen lamp</p> <ul style="list-style-type: none"> <li>➔ Tilt the mill head a little to the right. This way you can easily remove the lamp cover in order to allow replacing of the halogen lamp.</li> <li>➔ Plug a small screw driver into the recess between the lamp holder and the lamp cover.</li> <li>➔ By slightly turning the screw driver you can remove the lamp cover.</li> <li>➔ Pull the halogen pin base lamp with a cloth and replace the halogen lamp. Type: Halogen pin base lamp, Osram 12V - 10W, base G4</li> </ul>
every six months	<b>Spindle and spindle nut Z axis</b>	Lubricating	<ul style="list-style-type: none"> <li>➔ Open the plug.</li> <li>➔ Crank the milling head into the suitable height.</li> <li>➔ Oil or grease the spindle nut and spindle.</li> </ul>  <p style="text-align: center;">Fig.5-4: Column</p>



Interval	Where?	What?	How?
every six months	Gear drill-mill head	Lubricating	<p>→ Turn the drill-mill head as described under  "Swivelling the mill drill head" on page 32 completely by 90° to the right.</p> <p>→ Check if the clamping screws are firmly tightened as described under  "Swivelling the mill drill head" on page 32 and that the drill-mill head can not independently tilt.</p> <p>→ Disassemble the cover plate at the rear.</p> <p>→ Lubricate the gearwheels.  "Service material" on page 16</p> <div style="text-align: right;">  <p>Fig.5-5: Rear</p> </div>

## INFORMATION

The spindle bearing is lifetime-lubricated. It is not necessary to lubricate it again.



## 5.3 Repair

Repairs must be carried out only by qualified technical staff; and must follow the instructions and guidelines given in this manual. Should technical assistance be required, contact LDS Industries at (630) 785-6437.

Optimum Maschinen - Germany and LDS Industries are not liable for, nor do they guarantee against, damage or operating malfunctions resulting from alteration, abuse, lack of maintenance or this product's use for other than its intended purpose. Failure to read and follow this operating manual is not covered.

For repairs only use

- Proper and suitable tools,
- Parts purchased from Optimum, or its authorized agent.



## 6 Spare parts BF20 Vario

### 6.1 Cross table

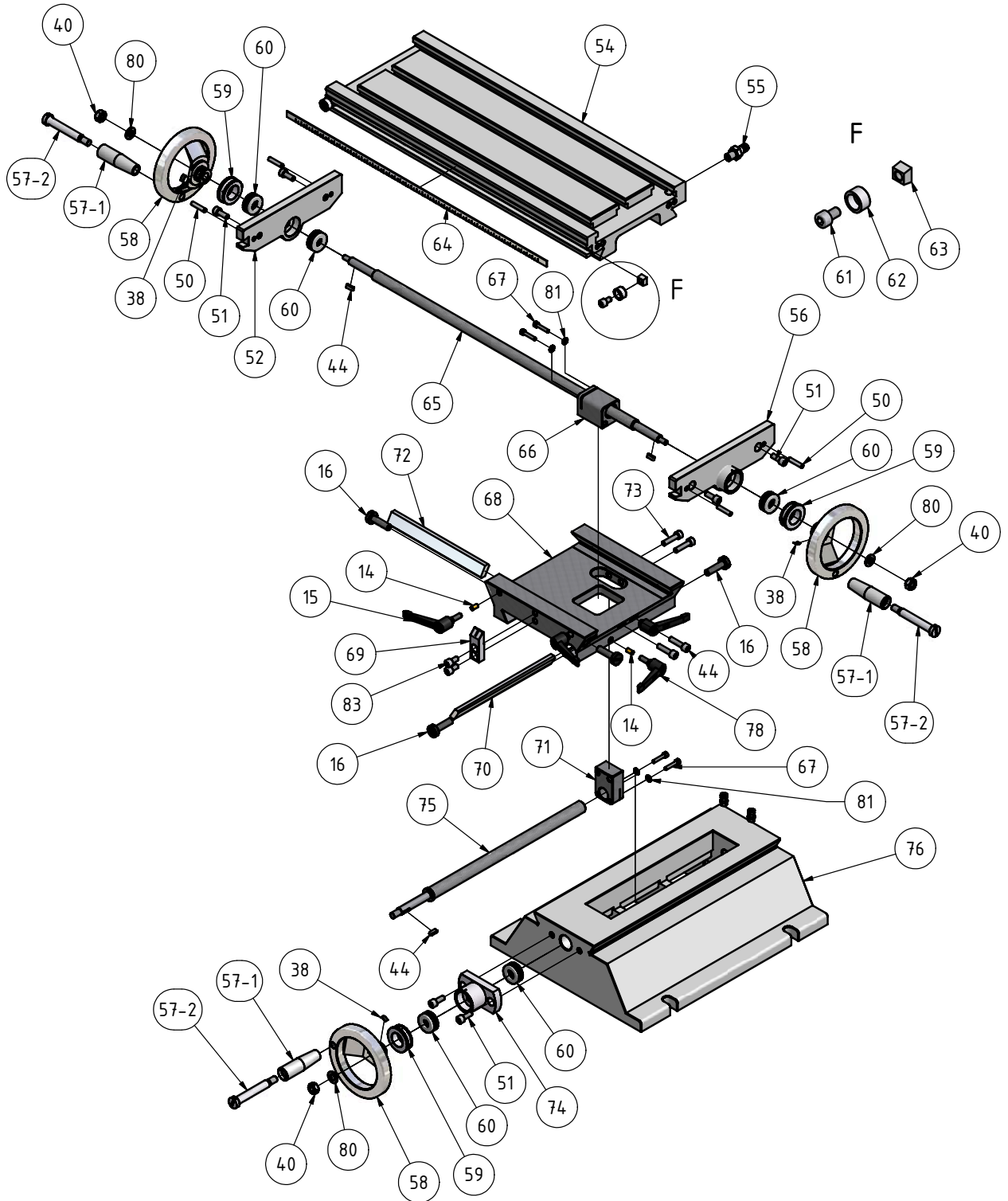


Fig.6-1: Cross table



## 6.2 Column 1 of 2

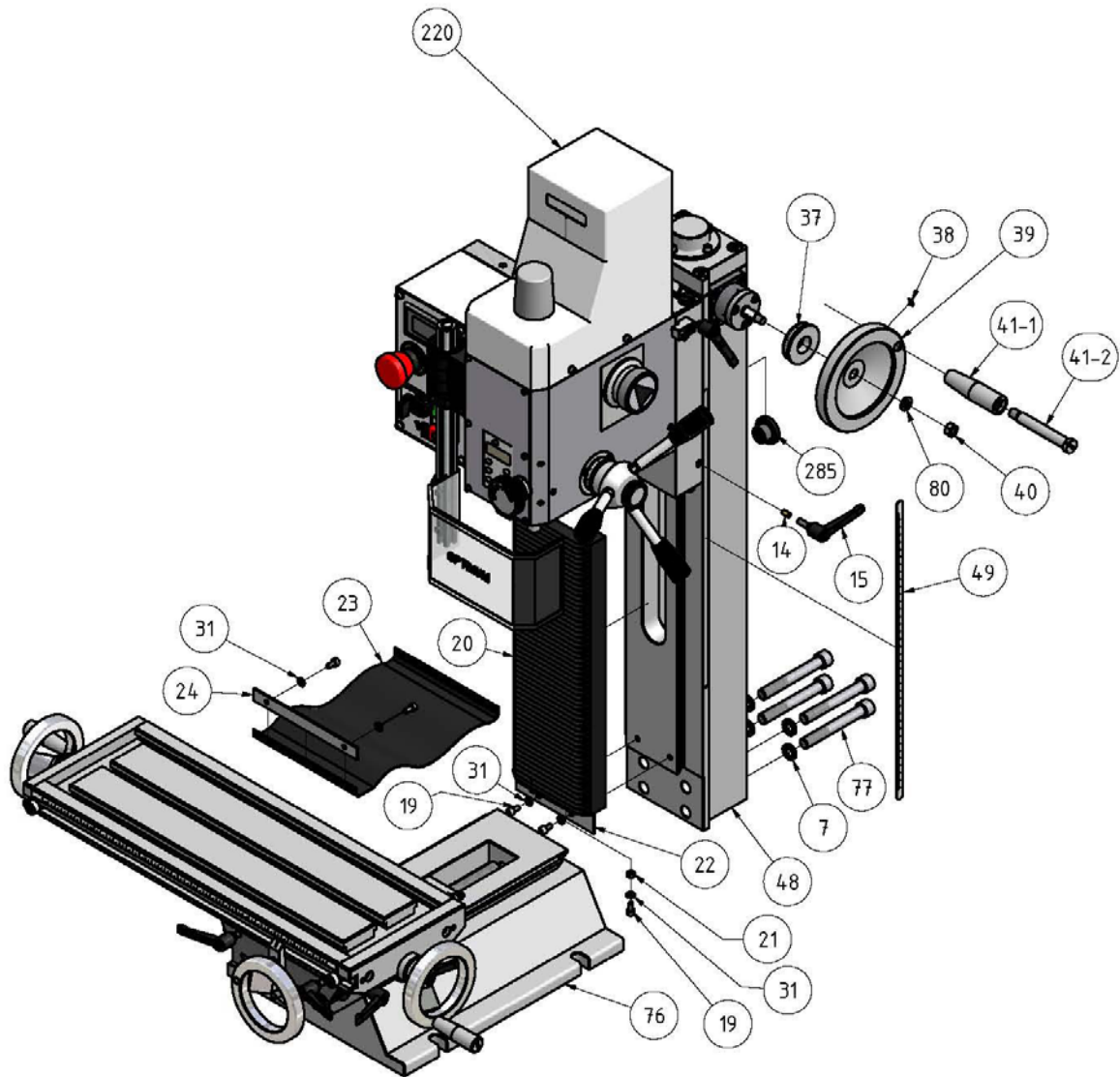


Fig.6-2: Column 1 of 2



### 6.3 Column 2 of 2

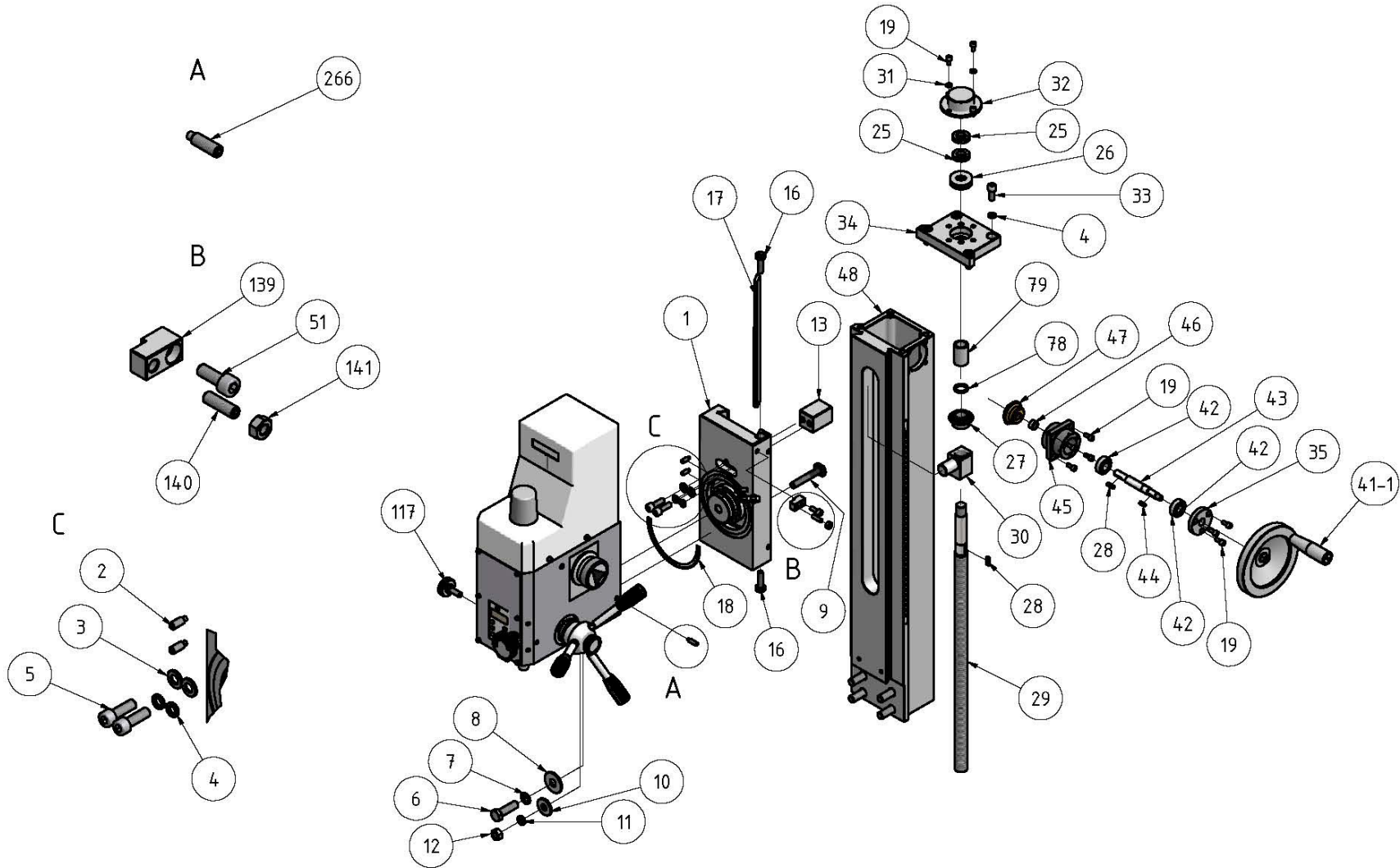


Fig.6-3: Column 2 of 2





## 6.4 Milling head 1 of 2

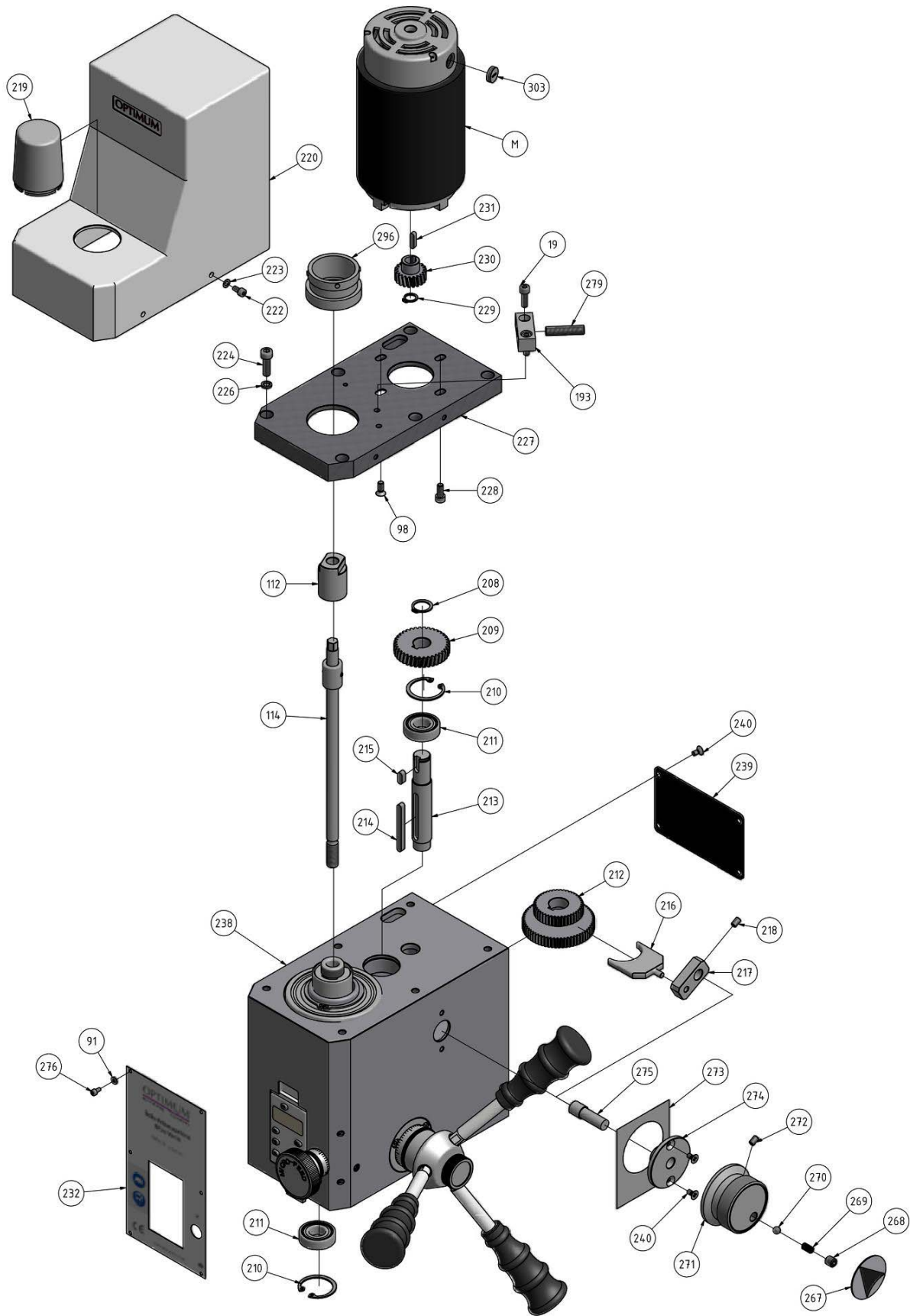


Fig.6-4: Milling head 1 of 2





## 6.5 Milling head 2 of 2

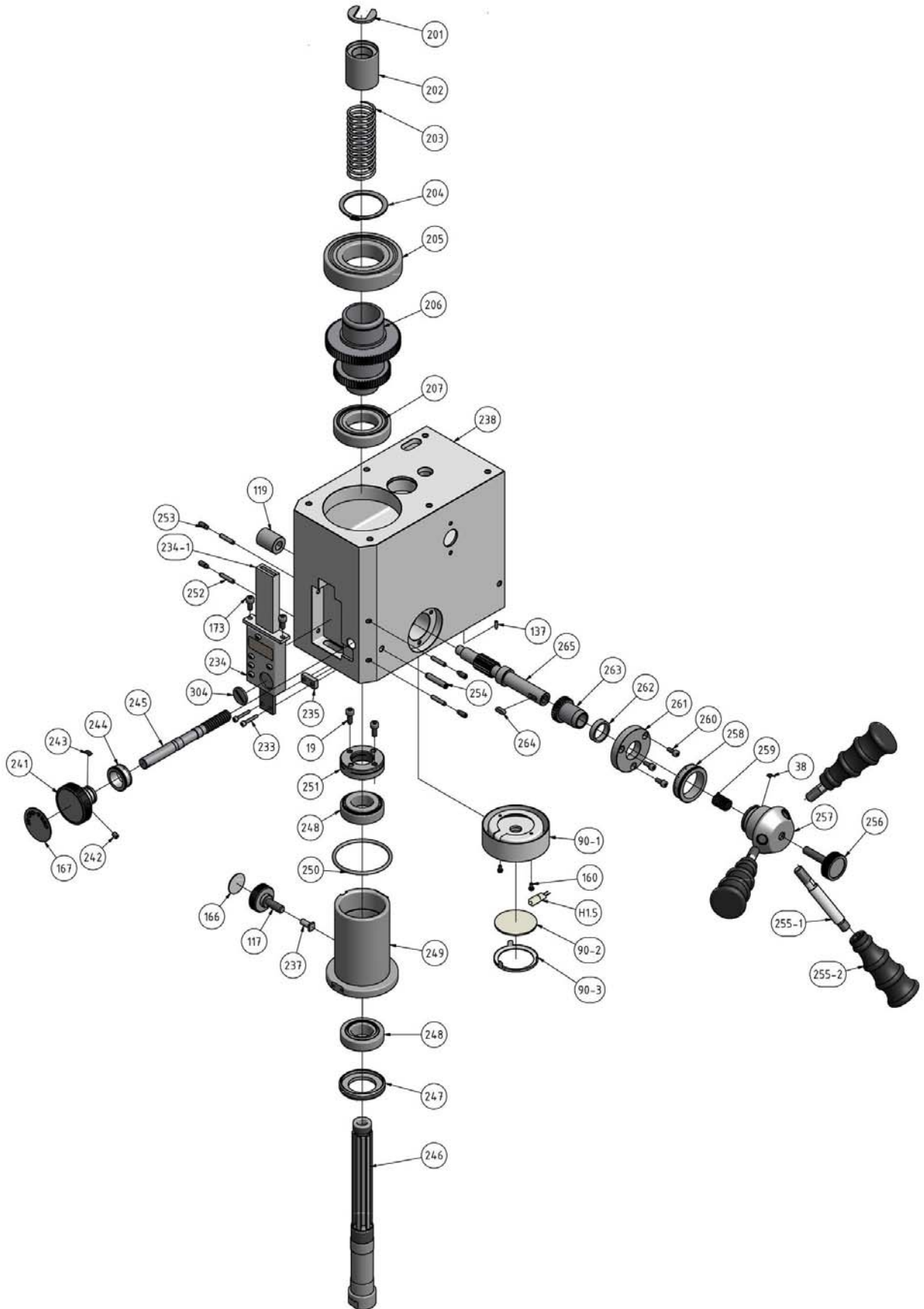


Fig.6-5: Milling head 2 of 2



## 6.6 Operation panel and protection device

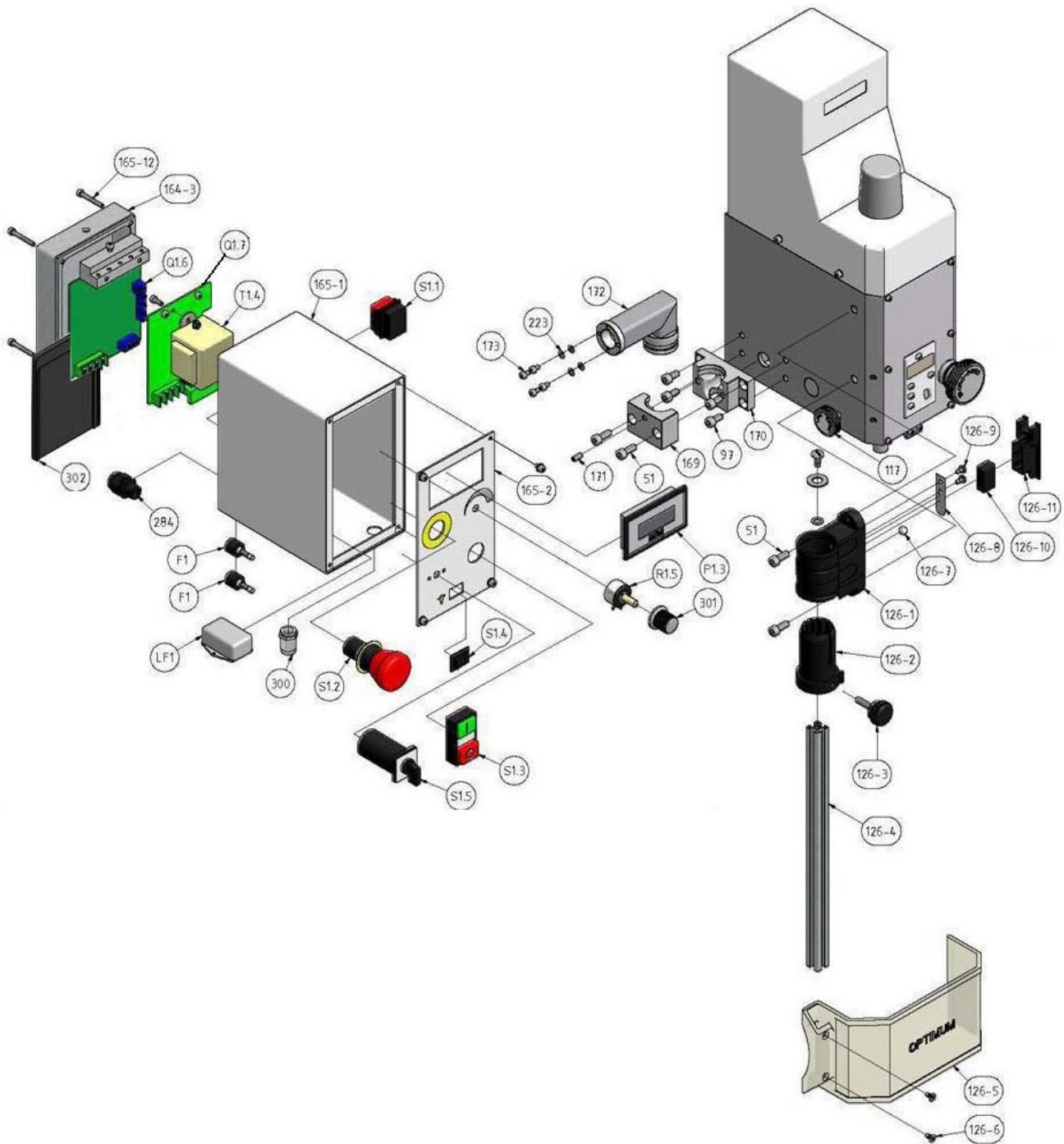


Fig.6-6: Operation panel and protection device



## 6.7 Optional sub structure

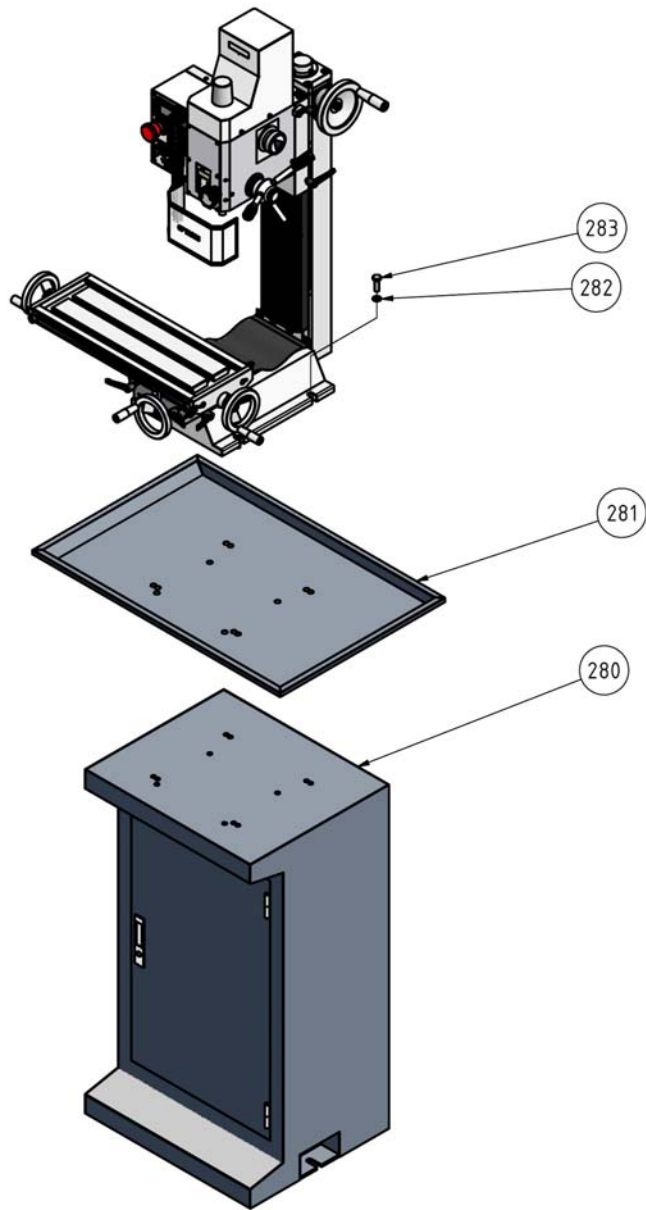


Fig.6-7: Sub structure



## 6.8 Wiring diagram

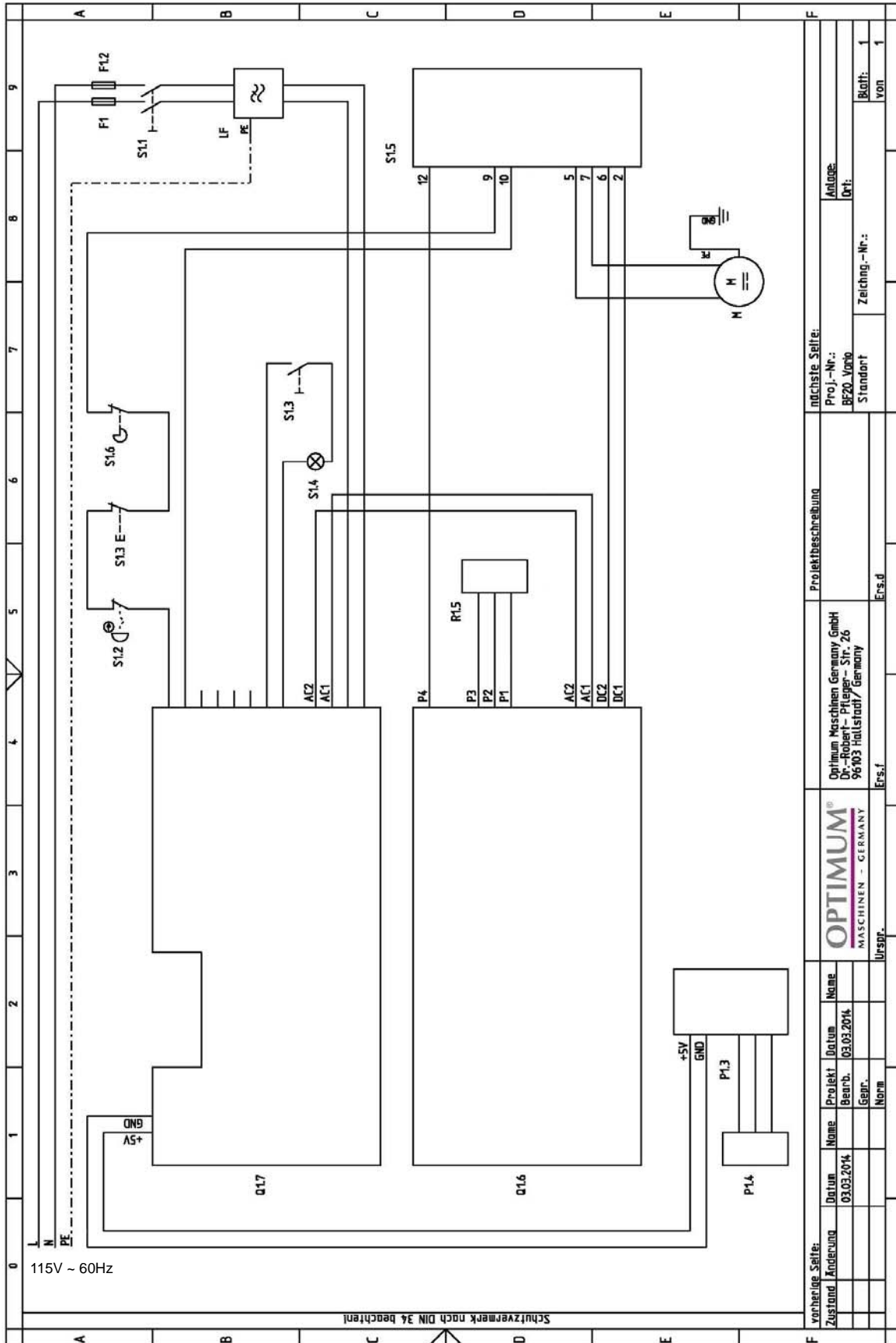


Fig.6-8: Wiring diagram



## 6.8.1 Spare part list

Pos.	Description	Qty.	Drawing no.	Size	Article no.
1	Connect board	1	DM14-01-14		0333812001
2	Socket head set screw	2	GB 79-85	M6 x 16	
4	Spring washer	6	GB 93-87	M8	
5	Hexagon head cap screw	2	ISO 4762	M8 x 25	
6	Hexagon head screw	1	GB 5783-86	M12 x 40	
7	Spring washer	5	GB 93-87	M12	
8	Washer	1	DM14-01-39		0333812008
9	Screw	1			0333812009
10	Washer	1	DM14-01-40		0333812010
11	Spring washer	1	GB 93-87	M10	
12	Hexagon nut	1	GB 6170-86	M10	
13	Connect collar	1	DM14-01-13		0333812013
14	Brass pin	6	DM14-00-05		0333812014
15	Adjust locating handle	4	JBT 7270.12-1994	DM6 x 16	0333812015
16	Gib screw	6	DM14-02-20		0333812016
17	Taper gib z axis	1	DM14-00-01		0333812017
18	Angle plate	1	DM14-00-03		0333812018
19	Hexagon head cap screw	20	GB 70-85	M5 x 10	
20	Bellows	1	DM14-00-06		0333812020
21	Hexagon nut	2	DIN EN 24 032	M5	
22	Bellows bracket	1	DM14-00-06		0333812022
23	Rubber splash guard	1	DM14-00-08		0333812023
24	Plate	1	DM14-00-09		0333812024
25	Groove nut	2	GB 810-88	M16x1.5	0333812025
26	Axially grooved ball bearing	1	51203	51203	04051203
27	Taper gear	1	DM14-03-06	26 Z ; m 1,5	0333812027
28	Key	3	DIN 6885	A 4 x 4 x 16	0333812028
29	Lift lead screw	1	DM14-03-04		0333812029y
30	Lift lead screw nut	1	DM14-03-05		0333812030y
31	Washer	8	GB 97.1-85	5	
32	Nut collar	1	DM14-03-01		0333812032
33	Hexagon head cap screw	4	GB 70-85	M8 x 20	
34	Column cover	1	DM14-03-02	alt / old	0320218
35	Bearing cover	1	DM14-03-10		0333812035
37	Lift dial z axis	1	DM14-03-11		0333812037y
38	Spring piece	4			0333812038
39	Handwheel z axis	1	DM14-03-13		0333812039
40	Hexagon nut	4	ISO 4033	M8	
41	Handle complete	1			0333812041
41-1	Handle sleeve	1	JB7270.5-1994-80	80	0333812041-1
41-2	Screw	1	JB7270.5-1994-M10	M10 x 80	0333812041-2
42	Grooved ball bearing single-row	2	6001-2RZ		0406001.2R
43	Lift shaft z axis	1	DM14-03-12		0333812043
44	Key	5	DIN 6885	A 4 x 4 x 12	0333812044
45	Lift bearing base	1	DM14-03-09		0333812045
46	Collar	1	DM14-03-08		0333812046
47	Taper gear	1	DM14-03-07		0333812047
48	Column	1	DM14-03-03		0333812048
49	Scale (inch)	1	DM14-00-04		0333812049y
50	Cylindrical pin	4	GB 119-86	A 5 x 24	
51	Hexagon head cap screw	11	GB 70-85	M6 x 16	
52	Table dial support x axis left	1	DM14-02-02	alt / old	0320232
54	Cross table	1	DM14-02-03	BF20	0333812054
54	Cross table	1	DM14-02-03L	BF20 L	0333812254
55	Screwing in screw connection hose connector	1	DM14-02-18	M10 x 1	0333812055
56	Table dial support x axis	1	DM14-02-06	alt / old	0320235
57	Handle complete	3			0333812057
57-1	Handle sleeve	3	JB7270.5-1994-63	63	0333812057-1
57-2	Screw	3	JB7270.5-1994-M8	M8 x 63	0333812057-2
58	Handwheel cross table	3	DM14-02-01		0333812058
59	Dial	3	DM14-02-19		0333812059y
60	Axially grooved ball bearing	5	51200	alt / old	04051200
61	Hexagon head cap screw	2	GB 70-85	M6 x 10	
62	Stopper x axis	2	DM14-02-04		0333812062
63	Wedgy nut	2	DM14-02-05		0333812063
64	Table plate x axis BF20	1	DM14-00-02	BF20	0333812064y
65	Table lead screw x axis BF20	1	DM14-02-11	BF20	0333812065y



Pos.	Description	Qty.	Drawing no.	Size	Article no.
66	Table lead screw nut x axis	1	DM14-02-09		0333812066y
67	Hexagon head cap screw	4	GB 70-85	M4 x 20	
68	Saddle	1	DM14-02-08	BF20	0333812068
69	Limit plate x axis	1	DM14-02-07		0333812069
70	Taper gib y axis	1	DM14-02-10		0333812070
71	Lead screw nut y axis	1	DM14-02-16		0333812071y
72	Taper gib x axis	1	DM14-02-17	BF20	0333812072
73	Hexagon head cap screw	2	GB 70-85	M6 x 25	
74	Saddle dial support	1	DM14-02-13		0320249
75	Lead screw y axis	1	DM14-02-14		0333812075y
76	Base	1	DM14-02-15	BF20	0333812076
77	Hexagon head cap screw	4	GB 70-85	M12 x 90	
78	Clamping lever	4	JBT7270.12-1994	DM6x16	0333812078
78	Spacer ring for spindle z axis	1	DM14-03-15		0333812078
79	Case for z axis	1	DM14-03-14		0333812079
80	Washer	6	GB 97.1-85	8	
81	Washer	2	GB 97.1-85	4	
83	Hexagon head cap screw	6	GB 70-85	M6 x 12	
90	Machine lightning complete	1			0333812090
90-1	Housing machine lightning	1			0333812090-1
90-2	Protection glas	1			0333812090-2
90-3	Cover machine lightning	1			0333812090-3
H 1.5	Halogen lamp 12V , 10 W, Socket G4	1			03338120H15
91		6	GB 97.1-85	3	
98	Countersunk screw	1	BS 4183	M5 x 12	
112	Holder screw rod	1	DM14-01-42		03338120112
114	Draw bar	1	DM14-20-02	3/8"-16	03338120114y
117	Clamping screw collar	1	DM14-01-43		03338120117
119	Endplate	1	DM14-01-25		03338120119
126	Protection device complete	1	BF20-XHZMX		03338120126
126-1	Housing	1	BF20-XHZMX		03338120126-1
126-2	Aluminium profile admission	1	BF20-XHZMX		03338120126-2
126-3	Clamping scew	1	BF20-XHZMX		03338120126-3
126-4	Aluminium profile	1	B15-04-02	L=290mm	03338120126-4
126-5	Protection	1	BF20-XHZMX		03338120126-5
126-6	Screw	2	BF20-XHZMX		03338120126-6
126-7	Steel ball	1	BF20-XHZMX		03338120126-7
126-8	Spring plate	1	BF20-XHZMX		03338120126-8
126-9	Screw	2	BF20-XHZMX		03338120126-9
126-10	Micro switch spindle protection	1	BF20-XHZMX		03338120126-10
126-11	Cover	1	BF20-XHZMX		03338120126-11
127	Hexagon head cap thread pin screw with point	1	GB 78-85	M5 x 6	03338120127
137	Scale-pin	1			03338120137
139	Stopper	1	DM14-00-10		03338120139
140	Hexagon head cap thread pin screw with flat end	1	GB 77-85	M6 x 20	
141	Hexagon nut	1	GB 6170-86	M6	
160	Cheese head screw	2	ISO 7045	M3 x 6 - 4.8 - H	
164-3	Housing control boards	1	DM14-10-04		03338120164-3
165-1	Panel housing	1	DM14-10-02A		03338120165-1
165-2	Cover	1	DM14-10-01A		03338120165-2
165-3	Cover	1			03338120165-3
165-12	Innensechskantschraube	4	GB 70-85	M4 x 30	
166	Label loose / tighten	1			03338120166
167	Label Micro feed	1			03338120167
168	Morse taper MK2 - B16	1	DM14-MS2W-B16		03338120168
169	Mounting plate panel	1	DM14-10-07		03338120169
170	Mounting plate panel	1	DM14-10-08		03338120170
171	Innensechskant-Gewindestift with cup point	1	GB 80-85	M5 x 12	03338120171
172	Holding arm panel	1	DM14-10-06		03338120172
173	Hexagon head cap screw	4	GB 70-85	M4 x 6	
201	Position washer	1	DM14-01-08		03338120201
202	Spring sleeve	1	DM14-01-07		03338120202
203	Spring	1	GB2089-94	2.5x28x110-3	03338120203
204	Retainer ring	1	GB 894.1 - 45		03338120204
205	Grooved ball bearing	1	6209-2Z	6209-2Z	0406209.2R
206	Gear combination	1	DM14-01-06	Z 60 / Z 80, m 1	03338120206





Pos.	Description	Qty.	Drawing no.	Size	Article no.
207	Grooved ball bearing	1	6007-2Z	6007-2Z	0406007.2R
208	Retainer ring	1	DIN 471	15 x 1	03338120208
209	Gear diagonally-toothed	1	DM14-01-10	Z 37, m 1,25, 9°	03338120209
210	Retainer ring	2	DIN 472	32 x 1.2	03338120210
211	Grooved ball bearing	2	6002-2Z	6002-2Z	0406002.2R
212	Gear combination	1	DM14-01-05	Z 62 / Z 42, m 1	03338120212
213	Intermediate shaft	1	DM14-01-04		03338120213
214	Key	1	DIN 6885	A 5 x 5 x 50	03338120214
215	Key	1	DIN 6885	A 5 x 5 x 12	03338120215
216	Fork	1	DM14-01-17		03338120216
217	Fork arm	1	DM14-01-16		03338120217
219	Cover	1	DM14-01-09		03338120219
220	Motor cover	1	DM14-01-35A		03338120220
222	Hexagon head cap screw	4	GB 70-85	M4 x 8	
223	Washer	8	GB 848-85	4	
224	Hexagon head cap screw	6	GB 70-85	M6 x 20	
226	Spring washer	6	GB 93-87	M6	
227	Fixed cover	1	DM14-01-20		03338120227
229	Retainer ring	1	GB 894.1	10	
230	Gear diagonally-toothed	1	DM14-01-11	Z 20, m 1,25, 9°	03338120230
233	Hexagon head cap screw	2	GB 70-85	M3 x 20	
234	Digital slide guage	1	DQ1		03338120234
234-1	Protective cover	1			03338120235
235	Base for ruler digital display	1	DM14-01-31		03338120237
237	Clamping and guide pin	1	DM14-01-34		03338120238
238	Housing milling head	1	DM14-01-19		03338120239
239	Cover	1	DM14-01-12		
240	Countersunk screw	6	GB 819-85	M4x8	
241	Micro feed knob	1	DM14-01-30		03338120241
242	Hexagon head cap thread pin screw with point	1	GB 78-85	M5 x 6	
243	Spring piece	1			03338120243
244	Micro feed dial	1	DM14-01-28		03338120244y
245	Worm shaft	1	DM14-01-27		03338120245
246	Spindle	1	DM14-01-03		03338120246
247	Nut	1	DM14-01-01		03338120247
248	Taper roller bearing single-row	2	32005 X/Q		04032005
249	Collar	1	DM14-01-02		03338120249
250	O-ring	1	GB 3452-1	58x2.65	03338120250
251	Clamp nut	1	DM14-01-41		03338120251
252	Cylindrical pin	4	GB 119-86	B4x20	
253	Thread pin slit with long tap	4	GB 79-85	M5 x 12	
254	Cylindrical pin	1	GB 120-86-A	6x30	
255	Handle complete	3			03338120255
255-1	Threaded rod	3	JB_T7271.6-1994	BM10x80	03338120255-1
255-2	Handle	3	JBT7271.5-1994		03338120255-2
256	Locking knob	1	DM14-01-21		03338120256
257	Feed handle disc	1	DM14-01-22		03338120257
258	Feed dial	1	DM14-01-36		03338120258y
259	Compression spring	1	GB2089-94	1.2x12x25-3	03338120259
260	Hexagon head cap screw	3	GB 70-85	M4 x 10	
261	Cover	1	DM14-01-26		03338120261
262	Adjust collar	1	DM14-01-37		03338120262
263	Clutch with gear	1	DM14-01-23		03338120263
264	Key	1	DIN 6885 A	4 x 4 x 12	03338120264
265	Toothed shaft	1	DM14-01-24		03338120265
266	Thread pin slit with long tap	1	GB 79-85	M6 x 20	
267	Plate	1	DM14-BP-03		03338120267
268	Hexagon head cap thread pin screw with flat end	1	GB 77-85	M8 x 8	
269	Compression Spring	1	GBT2089-94	0.8x5x25-3	03338120269
270	Steel ball	1	GBT308-1994	6,5	03338120270
271	Locating knob	1	DM14-01-33		03338120271
272	Hexagon head cap thread pin screw with point	2	GB 78-85	M5 x 8	
273	Shifting plate	1	DM14		03338120273
274	Locating base	1	DM14-01-38		03338120274
275	Shifting shaft	1	DM14-01-15		03338120275



Pos.	Description	Qty.	Drawing no.	Size	Article no.
276	Hexagon head cap screw	6	GB 70-85	M3 x 6	
277	Angle sensor	1			03338120277
278	Hexagon head cap screw	2	GB 70-85	M5 x 8	
279	Sensor, number of revolutions	1			03338120279
280	Optional sub structure	1			03338120280
281	Optional pan sub structure	1			03338120281
282	Washer	4	GB 848-85	10	
283	Hexagon head screw	4	GB 5783-86	M10 x 30	
284	Strain relief connection cable	1			03338120284
285	Lubrication catch	1			03338120285
286	Table dial support x axis left	2	DM14-02-02-A		03338120286
287	Grooved ball bearing, single-row	1	6000		0406000.2R
288	Snap ring	1	DIN 472	28 x 1,2	03338120288
289	Distance case	1			03338120289
290	Distance case	1			03338120290
291	Table dial support x axis	1	DM14-02-06-A		03338120291
292	Skew-angle roller bearing, double-row	1	3203		0403203
293	Column cover	1	DM14-03-02-A		03338120293
294	Skew-angle roller bearing, double-row	2	3200		0403200
295	Saddle dial support	1	DM14-02-13-A		03338120295
296	Sensor ring	1			03338120296
299	Distance case	1			03338120299
300	Start- Stop connection for CNC controller	1			03338120300
301	Knob	1			03338120301
302	Plastic plate	1			03338120302
303	Plug	2			03338120303
304	Plug	1			03338120304
S1.1	Main switch	1			03338120S1.1
S1.2	Emergency push button	1			03338120S1.2
S1.3	On- Off push button	1			03338120S1.3
S1.4	On- Off switch halogen lamp	1			03338120S1.4
S1.5	Change over switch ZH-A	1			03338120996
S1.6	Micro switch spindle protection	1			0333812012610
R1.5	Potentiometer 4,7 K $\Omega$	1			0320298
T1.4	Transformer 230V / 12V	1			03338120T1.4
P1.3	Digital speed indicator	1			03338120P1.3
Q 1.6	Control board	1		JYMC-220B-II	03338128Q1.6
Q1.7	Relay board	1		115V	03338128Q1.7
H 1.5	Halogen lamp 12V , 10 W, socket G4	1			03338120H15
M	Motor	1		110V DC	03338128221
M - 1	Carbon brush motor	2			03338120994
X1	Cable	1			03338120998
F1/ F1.2	Fuse	2		10A	03338120F1y
LF1	Line filter	1			03338120LF1
LF2	Line filter	1			03338120LF2





## 7 Troubleshooting

### 7.1 Troubleshooting the mill drill

Malfunction	Cause/ possible consequences	Solution
The mill drill does not start	<ul style="list-style-type: none"> <li>Start sequence not followed.</li> </ul>	<ul style="list-style-type: none"> <li> "Switching on the mill drill" on page 25</li> <li>Have it checked by authorised staff.</li> </ul>
Tool "burnt".	<ul style="list-style-type: none"> <li>Incorrect speed.</li> <li>The chips have not been removed from the bore hole.</li> <li>Tool blunt.</li> <li>Operating without cooling agent.</li> </ul>	<ul style="list-style-type: none"> <li>Select another speed, feed too high.</li> <li>Retract tool more often</li> <li>Sharpen and replace tool.</li> <li>Use coolant.</li> </ul>
Impossible to insert holding taper into the spindle sleeve.	<ul style="list-style-type: none"> <li>Remove any dirt, grease or oil from the internal conical surface of the spindle sleeve or the holding taper.</li> </ul>	<ul style="list-style-type: none"> <li>Clean surfaces well.</li> <li>Keep surfaces free of grease.</li> </ul>
Taper cannot be removed	<ul style="list-style-type: none"> <li>Optional MT3 taper seat shrunk on morse cone.</li> </ul>	<ul style="list-style-type: none"> <li>Have the machine heat-up at highest speed for about two minutes and then try again to disassemble the taper.</li> </ul>
Motor does not start	<ul style="list-style-type: none"> <li>Defective fuse</li> </ul>	<ul style="list-style-type: none"> <li>Have it checked by authorised staff.</li> </ul>
Working spindle rattling on rough workpiece surface	<ul style="list-style-type: none"> <li>Climb milling machining not possible under the current operating conditions.</li> <li>Clamping lever of the movement axes not tightened.</li> <li>Loose collet chuck, loose drill chuck, loose draw-in rod.</li> <li>Tool blunt.</li> <li>Workpiece is not fixed.</li> <li>Excessive slack in bearing.</li> <li>Working spindle goes up and down.</li> </ul>	<ul style="list-style-type: none"> <li>Perform conventional milling.</li> <li>Tighten clamping lever</li> <li>Check, retighten.</li> <li>Sharpen or replace tool</li> <li>Secure the workpiece properly.</li> <li>Readjust bearing slack or replace bearing.</li> <li>Readjust bearing slack or replace bearing.</li> </ul>
Fine feed of spindle sleeve does not work	<ul style="list-style-type: none"> <li>Fine feed is not correctly activated</li> <li>Clutch of the fine feed does not engage, is dirty, smeared, worn or defective</li> </ul>	<ul style="list-style-type: none"> <li> "Manual spindle feed with the fine feed" on page 30</li> <li>Clean, replace</li> </ul>



## 8 Appendix

### 8.1 Copyright

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Subject to technical changes without notice.

### 8.2 Terminology/Glossary

Term	Explanation
Cross table	Bearing surface, clamping surface for the workpiece with X- and Y-axis travel
Taper mandrel	Cone of the drill or of the drill chuck
Draw-in rod	Threaded rod to fix the taper mandrel in the spindle sleeve.
Drill chuck	Device for holding the bit
Collet chuck	Holder for end mill
Drilling and milling head	Upper part of the mill drill
Spindle sleeve	Hollow shaft in which the milling spindle turns.
Milling spindle	Shaft activated by the motor
Drilling table	Supporting surface, clamping surface
Taper mandrel	Cone of the drill or of the drill chuck
Spindle quill lever	Manual operation for the drill feed
Quick action - drill chuck	Drill chuck can be fixed by hand.
Workpiece	Piece to be drilled or machined.
Tool	Milling cutter, drill bit, etc.

### 8.3 RoHS , 2002/95/CE

The sign on the product or on its packing indicates that this product complies with the European guideline 2002/95/EC .





## 8.4 LIMITED WARRANTY

**OPTIMUM ONE-YEAR LIMITED WARRANTY.** OPTIMUM, MODELS COVERED IN THIS MANUAL, ARE WARRANTED BY OPTIMUM TO THE ORIGINAL USER AGAINST DEFECTS IN WORKMANSHIP OR MATERIALS UNDER NORMAL USE FOR ONE YEAR AFTER DATE OF PURCHASE. ANY PART WHICH IS DETERMINED TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP AND RETURNED TO AN AUTHORIZED SERVICE LOCATION, AS OPTIMUM DESIGNATES, SHIPPING COSTS PREPAID, WILL BE, AS THE EXCLUSIVE REMEDY, REPAIRED OR REPLACED AT OPTIMUM OPTION. FOR LIMITED WARRANTY CLAIM PROCEDURES, SEE "PROMPT DISPOSITION" BELOW. THIS LIMITED WARRANTY GIVES PURCHASERS SPECIFIC LEGAL RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION.

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**Prompt Disposition.** A good faith effort will be made for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to OPTIMUM at address below, giving dealer's name, address, date, and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

**Manufactured for OPTIMUM, LDS Industries, LLC, 930 W. National Ave. Addison, IL 60101, Tel.: 1-630-785-6437**



## EC - Declaration of Conformity

Machinery Directive 2006/42/EC Annex II 1.A

**The manufacturer /  
retailer:** Optimum Maschinen Germany GmbH  
Dr.-Robert-Pfleger-Str. 26  
D - 96103 Hallstadt

**hereby declares that the following product,**

**Product designation:** Drilling- milling machine

**Type designation:** BF20V  
BF20L

**Serial number:**

**Year of construction:**

Manual milling machine for private user, as well as craft and industrial plants which meets all the relevant provisions of the above mentioned Directive 2006/42/EC as well as the other directives applied (below) including their amendments in force at the time of declaration.

The following other EU Directives have been applied: EMC Directive 2014/30/EC, Low Voltage Directive 2014/35/EC

The safety objective meet the requirement of EC Directive 2006/95/EC

**The following harmonized standards were applied:**

EN 13128:2001+A2:2009/AC:2010  
Safety of machine tools - Milling machines (including boring machines)

EN 60204-1:2006/A1:2009  
Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005/A1:2008)

EN ISO 12100:2010  
Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

Person responsible for the document: Kilian Stürmer,  
Phone: +49 (0) 951 96555 - 800

Address: Dr.-Robert-Pfleger-Str. 26  
D - 96103 Hallstadt

Kilian Stürmer  
(CEO / Managing director)  
Hallstadt, 2015-01-19



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